

UNCLASSIFIED

AD NUMBER	
AD517843	
CLASSIFICATION CHANGES	
TO:	UNCLASSIFIED
FROM:	CONFIDENTIAL
LIMITATION CHANGES	
TO: Approved for public release; distribution is unlimited.	
FROM: Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational Use; 06 AUG 1971. Other requests shall be referred to Office of the Adjutant General (Army), Washington, DC 20310.	
AUTHORITY	
AGO ltr 11 Jun 1980 ; AGO ltr 11 Jun 1980	

THIS PAGE IS UNCLASSIFIED

THIS REPORT HAS BEEN DELIMITED
AND CLEARED FOR PUBLIC RELEASE
UNDER DOD DIRECTIVE 5200.20 AND
NO RESTRICTIONS ARE IMPOSED UPON
ITS USE AND DISCLOSURE.

DISTRIBUTION STATEMENT A

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

SECURITY

MARKING

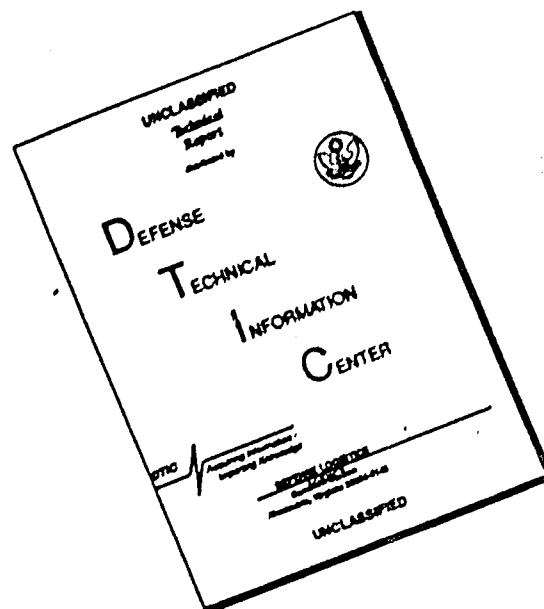
The classified or limited status of this report applies to each page, unless otherwise marked.

Separate page printouts MUST be marked accordingly.

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECTIONS 793 AND 794. THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U.S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.



CONFIDENTIAL

**DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D.C. 20310**

(2)

IN REPLY REFER TO

DAAG-PAP (M) (28 Sep 71) DAFD-OTT-71B037

21 October 1971

SUBJECT: Senior Officer Debriefing Report: ~~Charles C. Noble~~
USA Engr Cmd, RVN, 29 Jun 70 thru 5 Aug 71 (U) (8)

SEE DISTRIBUTION

(10) Charles C. Noble

(11) 6 Aug 71

1. Reference: (C) AR 525-14, subject, Senior Officer Debriefing Report (U) dated 2 July 1971.

2. Transmitted herewith is the report of MG Charles C. Noble, subject as above.

3. This report is provided to insure appropriate benefits are realized from the experiences of the author. The report should be reviewed in accordance with paragraph 3 and 5, AR 1-26; however, it should not be interpreted as the official view of the Department of the Army, or of any agency of the Department of the Army.

4. Information of actions initiated under provisions of AR 1-26, as a result of subject report, should be provided DAFD-OTT within 90 days of receipt of covering letter.

BY ORDER OF THE SECRETARY OF THE ARMY:

Verne L. Bowers
VERNE L. BOWERS
Major General, USA
The Adjutant General

DDC
RECEIVED
NOV 4 1971
REGULATED
A

THIS DOCUMENT
DEFENSE OF THE
ESPIONAGE LAW
ITS TRANSFER
ANY MARK

1 Incl
as

DISTRIBUTION:

- Commanding Generals
 - US Continental Army Command
 - US Army Combat Developments Command
 - US Army Materiel Command
- Commandants
 - US Army War College
 - US Army Command and General Staff College
 - US Army Armor School
 - US Army Aviation School

Regraded unclassified when separated from classified inclosure.

CONFIDENTIAL

003 650 ✓

AD No. _____
DDC FILE COPAD 517843

CONFIDENTIAL

2

US Army Engineer School
US Army Institute for Military Assistance
US Army Military Police School
US Army Ordnance School
US Army Quartermaster School
US Army Signal School
US Army Transportation School

Copies Furnished:

Office, Chiefs of Staff
Deputy Chiefs of Staff
Director of Military Support
Chief of Research and Development
Assistant Chief of Staff for Intelligence
Assistant Chief of Staff for Communications-Electronics
Chief of Engineers
Judge Advocate General
Chief of Military History
The Provost Marshal General
Office of the Joint Chiefs of Staff
Office of the Director of Defense Research & Engineering
Commanders in Chief
Pacific
US Army, Pacific
US Army, Europe
US Strike Command
Commanding General, US Army, Alaska
Commander, US Army Forces Southern Command
Chief of Staff, USAF
Chief of Naval Operations
Commandant of the Marine Corps
Commandants
Armed Forces Staff College
Industrial College of the Armed Forces
The National War College
Defense Documentation Center
Commanding Officers
US Army Construction Engineering Research Laboratory
US Army Logistics Doctrine, Systems & Readiness Agency
US Army Mobility Equipment Research & Development Center
US Army Land Warfare Laboratory



2

CONFIDENTIAL

CONFIDENTIAL

3

DEBRIEFING REPORT (RCS-CSFOR-74) (U)

Country: Republic of Vietnam

Debrief Report by: Major General Charles C. Noble

Duty Assignments: Engineer, US Army Vietnam

Commanding General, US Army Engineer Command, Vietnam

Inclusive Dates: 25 June 1970 - 6 August 1971

Date of Report: 6 August 1971

**Regraded unclassified when separated
from classified Inclosure.**

i

CONFIDENTIAL

CONFIDENTIAL

4

PREFACE

This report is submitted in accordance with AR 1-26. It is in three parts. Part I, a general evaluation, includes my thoughts on organization, combat and operational support, base construction, the LOC program, logistics, personnel, and Vietnamization. Part II is a historic summary of the more significant operations and accomplishments. Part III is an evaluation of the commercial construction equipment which has made a major contribution to the LOC program.

No attempt has been made to comment on all aspects of the broad spectrum of operations conducted by the Engineer Command during the period of this report. My remarks are addressed primarily to points which I consider need additional study; or which I believe need remedial action to take advantage of the combat and operational lessons learned in Vietnam.



CHARLES C. NOBLE
Major General, US Army
Commanding

ii

CONFIDENTIAL

5
CONFIDENTIAL

PART I. GENERAL EVALUATION: Observations of a Commander

MY MISSION

The General's mission was
My mission has been to advise the Deputy Commanding General, US Army Vietnam, on engineer matters; to command the US Army Engineer Command, Vietnam; and to ensure optimum utilization of Army engineer resources in Vietnam. Among the principal objectives of the Engineer Command have been to get the USARV portion of the lines of communication (LOC) completed to a high standard of quality and as soon as possible; to help the ARVN prepare to take over the engineer task "across the board" upon our departure; and to ready US Engineer units for redeployment as soon as they could possibly be released.

ORGANIZATION

Upon my arrival, the Engineer Command was structured into two Engineer brigades, six groups, 23 battalions, and a number of separate companies and detachments. There also were three Engineer District Headquarters, reporting directly to the Engineer Command, and responsible for facilities engineering throughout South Vietnam, except in the Hue-Phu Bai-Da Nang area, which was the largest US Navy public works district in the world. On 1 July 1970, after very short notice, the Engineer Command assumed facilities engineering responsibility over this excepted area, and assigned it to the Northern Engineer District. The concurrent major slash in the facilities engineer budget made the work of the subsequent year, a rather "sporty course" to maintain essential housekeeping functions and O&M support to the troops in the field.

In the past 14 months, the two brigade headquarters, two of the six group headquarters, and seven battalions have been inactivated. Three more battalions are in "stand-down" status at this time. At the time the two brigade headquarters and two group headquarters were eliminated, only five battalions had been dropped. Yet, we were able to forego this entire echelon of command control because of the advantages of air mobility and modern communications. These two developments vastly expand the capacity of a commander to control an operation over a wide geographical area, increasing the span of control, and reducing the requirements for intermediate headquarters. Intermediate headquarters, if not essential for command or control, only serve to slow down the action, to dilute the force of policies and directives, and to fritter away precious high quality manpower resources. This restructuring of the Engineer Command has

DAFD-OTT
71B037

Incl.

1
CONFIDENTIAL

**DOWNGRADED AT 3 YEAR INTERVALS,
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10**

CONFIDENTIAL

6

tightened up the "outfit," and improved control, rather than the converse. I believe the Army is heading for a quantum jump in command control made possible by modern air mobility, communications, and "IBM" machines. I believe that given modern transportation and communication, and with the integration of aviation into our units, not only tactically, but for command control, and logistics, there should develop a profound effect upon Army concepts for structuring a force.

ENGINEER COMMAND CONCEPT

The Engineer Command concept under which all non-divisional engineer assets are gathered under centralized control has proven out. This concept has given the greatest possible flexibility to the theatre commander, in this case, the CG USARV, making possible the optimum use of Army Engineer resources, which are always in short supply. Changing situations require a changing mix of engineer personnel and equipment resources. By placing all non-divisional engineers under one command, USARV has been able to shift these resources rapidly to the point of action and of desired emphasis. In this way, each field commander has had, in effect, the total resources of the Engineer Command at his disposal if he got into a "bind," or when he had a priority task to carry out.

THE NEED FOR ORGANIZATIONAL FLEXIBILITY

Within Engineer TOE organizations there remains the requirement for greater flexibility. This is especially true in engineer construction battalions because of the broad diversification of operations and missions. The engineer should be able to tailor his organization within reasonable limits to the environment and to changing tasks with minimum lost motion or irrelevant constraints. A civilian contractor builds a new organization and assembles a different set of equipment for each job. We can take a page out of the contractor's book. To a degree, we have been doing this in the Engineer Command. Many of our battalions have been reshaped into task forces, augmented by construction support companies, dump truck companies, and other specialized units. Battalions have internally reorganized their assets into more functional arrangements, depending on the job, without jeopardy to their command associations and to command integrity essential to preserve command and control. With USARV approval, Engineer units on fairly well circumscribed tasks, such as LOC, have been permitted to turn in superfluous equipment and strip down for the job at hand.

CONFIDENTIAL

CONFIDENTIAL

I would encourage studies by DA to devise means to expand the capacity of a theatre commander to modify his TOE's, without the loss of the DA control essential for accounting and support purposes. Perhaps a greater recourse to WABTC (When Authorized by Theatre Commander) is in order.

For some time I have considered another organizational change within the Engineer Command: a closer association of the district engineer operation with that of the engineer groups. These two organizations have been parallel entities, coming together at the top, at the Engineer Command level. When a district engineer required troop support, he requested it from Engineer Command. This worked adequately, but I detected a tendency on the part of District Engineers to try to make do "too long" before calling for help. I have also been dissatisfied with the command control over the various small facilities engineering detachments assigned to the District Engineers. The District Engineer is not staffed adequately to oversee command and discipline problems, to handle administration, to make inspections, etc. Accordingly, I have recently ordered that these facilities engineering detachments be attached to the closest TOE Engineer unit, and that the Engineer unit should then be given the task of giving direct support to the District Engineer involved. While the intention is that the support to be rendered will consist routinely of the engineer detachments, the potential for greater effort and resources is inherent in the scheme. In this way, I hope to get the best of two worlds, better command control over small specialized detachments, and better troop support to facilities engineering, which needs help to stretch out its austere budget.

COMBAT AND OPERATIONAL SUPPORT

The first priority task of the Engineer Command is combat and operational support. This accounts on the general average for about 40 per cent of the Engineer Command effort. I believe that the Command has been commendably responsive to combat requirements. Generals Collins, Davison, and Sutherland have been uniformly generous in their praise of the engineer support they have received. It was flattering indeed for the Engineers to feel so appreciated, especially when LTG Sutherland, in "fighting off" an Engineer drawdown in MR 1, offered infantry, artillery, and armored cavalry units instead, to make up the necessary space drawdown.

CONFIDENTIAL

Tactical Road Program.

A major operational support mission is the tactical road program, which not only is essential to operational maneuver, control, and support but has a long-range value in the pacification effort. Construction of fire support bases and perimeter defenses has also received considerable and sustained engineer effort. On reflection, it may have been better to have started the tactical road program sooner, and pushed it with a higher priority.

Land Clearing.

One of the significant findings of this war is the importance of the land clearing tractor of the Engineers. Senior commanders are unanimous in their praise for the land clearing performed by engineers equipped with the now famous "Rome plow." General Davison told me that land clearing was of the greatest importance, and had proven to be a "strategic" weapon. Land clearing operations deprive the enemy of sanctuaries, and also make available new agricultural land which can be settled, cultivated, and easily pacified. A number of lessons have been learned in land clearing operations. First, a close and responsive direct support maintenance capability is absolutely essential if a land clearing unit is to be effective.¹ Secondly, a land clearing battalion, organized along functional lines, facilitates management, administration and maintenance of the

¹The land clearing units in Military Regions (MR) 1 and 2 are attached to combat battalions which do not have organic direct support maintenance capability. As a result, these land clearing units must rely on supporting direct support maintenance units. The result has been a higher deadline rate. A land clearing unit demands so much maintenance that it saturates the capabilities of direct support maintenance units, which are not designed for that kind of strain. So much maintenance support is required that it must be integrated into the land clearing unit and exclusively dedicated to keeping the tracks going. Combat engineer operations as well are much too demanding -- too hard on equipment -- to rely on "across-the-board" DSU's. We found that construction battalions, with their organic DSU's, were better able to maintain their equipment even though they had more of it.

separate land clearing companies. Thirdly we found that security for land clearing units must include armored cavalry units.² Finally, we found that a command helicopter with radio contact to each plow operator is essential to control the plows and the operation in heavy jungle.

A spin-off benefit of land clearing lies in pacification. For example, the Soul Cat area was a strong VC-controlled area of South Vietnam. Once cleared by the plows it was used as a resettlement area for refugees from Cambodia and now constitutes a model of pacification. Once again, as in the example earlier of the tactical road program, if we were to do it over, we would probably have stressed land clearing sooner, and hit it harder as soon as and wherever the tactical situation would have permitted it.

Countermining Warfare.

Another important combat support mission is countermining warfare. Twenty (20) per cent of all KIA's and 25 per cent of all WIA's have been caused by enemy mines and booby traps. Roughly 80 per cent of all equipment combat losses have been caused by mines. We are still a long way from solving the mine detection problem. Efforts to do so seem to die between wars. There has not been any significant progress in our capacity to find mines "the right way" since World War II. This subject needs emphasis and creative thinking.

STANDARDS OF BASE CONSTRUCTION

With regard to base construction, there remains the nagging question as to whether we were right in building up a vast network of fixed base areas and installations. The job of maintaining these is onerous to the troops and costly in terms of effort and money. One can question whether the facilities we have built were necessary for morale. No one has a standard of living more primitive than the Rome plow operator in his NDP (night defensive position); yet his morale is highest when he is out in the

²Foot troops simply cannot stay up with the tracks to provide the necessary security and combined operations. We tried to provide security in MR 3 with only Regional Forces and Popular Forces (RF/PF) and it was a disaster. Although the present US commanders in MR 1, 2, and 3 understand this, as US security troops are drawn down further, there may be a temptation to try to "get by" without the armored cavalry partner.

CONFIDENTIAL

10

cut -- not when he is back in base camp on maintenance stand-down.

We have all heard the old argument that a tent probably costs more than the wooden tropical hootch, which lasts longer. But the hootch isn't the end; soon someone closes it up and installs an air conditioner. Then partitions are added; more air conditioning is required; re-wiring of the hootch is necessary; and more generators must be installed to provide the power. Then high voltage power; then back-up generators; as the business of the installation and its occupants become totally conditioned to and reliant upon uninterrupted power. Nothing can cause a "flap" sooner than a power outage, not even an enemy assault. What has happened to the Coleman lantern? In all my time in Vietnam, I have never seen one.

The question to be resolved in future comparable situations is whether the Army in the field should not concentrate more on its mission and less on bedding itself down. It is not only a question of money; it is also a question of dissipation of troop effort, and escalation of support effort and structure required. A study would be desirable while we still have a large number of people on active duty who have served at every level of command in the Vietnam environment, and who can offer worthwhile opinions and views on the subject. Obviously, some base camp structure needs to be maintained for the troops to come back to for clean-up, maintenance, rest, and for storage of personal gear. The question to be resolved is "how much base structure is really needed?" And once it is created, how do we keep our successive commanders from feeling impelled to improve it and "plush" it out? Each successive upgrading activates the insatiable appetite for the next level of improvement.

New construction continues at a surprisingly high rate; ten per cent to 15 per cent of the Engineer Command effort is devoted to this task. This situation obtains, in spite of the drastic restrictions on construction which have been imposed, to include an unprecedentedly severe USARV-imposed \$500 limit for field approval. It is hard to get a project approved, which is good in the present "drawdown" situation; but when an urgently required or high command interest project is approved, efforts are bent more toward immediate execution rather than toward cutting the project back to an austere adequate scope. Even urgent, high interest projects will have to be subjected to a very critical eye as to scope. This will become more important as redeployment continues, and amortization time is reduced.

CONFIDENTIAL

CONFIDENTIAL

LOC

Our major Engineer troop effort, about 50 per cent of the total, is on the lines of communication (LOC) program. When completed, this important nation-building program will provide 4,076 kilometers of two-lane, all weather road connecting major population centers throughout Vietnam. This will be something of permanent value to Vietnam. One can argue that the LOC program should also have been started earlier. The security and pacification benefits of good roads are of great value in a Vietnamese-type conflict.

The capability of engineer construction units to carry out the LOC program was greatly augmented by the purchase of commercial equipment, commonly referred to as MCA LOC equipment, specifically for the LOC program. This equipment is off-the-shelf commercial equipment. I believe that the 733 commercial items of construction equipment increased production by at least 50 per cent. When one considers the cost of maintaining troops in Vietnam, and the value of early completion, this increased productivity is of great importance. We should, however, have bought more and we should have bought it sooner. Our LOC battalions have been almost invariably "haul-limited" indicating a need for a great many more dump trucks. There were insufficient segmented compactors, not enough 5000 gallon water sprinkler tankers, inadequate repair parts kits, zero float generators, etc. These inadequacies proved to be very costly in productivity lost and unit construction operations held up for a small repair part somewhere in the chain of the operation. Considering the total estimated cost of about \$1.2 million per month to maintain a construction battalion in the Army and overseas in Vietnam, any deficiencies, such as lack of a few pieces of critical equipment or repair parts that have a rippling retardation effect on the work can prove to be very costly. However, these shortcomings are problems of execution and imply no criticism of the MCA LOC equipment concept. The ad hoc purchase of commercial equipment, and use of contract personnel to maintain it, represent a real breakthrough in thinking which warrants vigorous exploitation wherever circumstances are favorable. An evaluation of the MCA LOC equipment is contained in Part III of this report.

LOGISTIC SUPPORT

The overall Army logistic system is good, but it is not universally good. In spite of great dedication on the part of the Inventory Control Center Vietnam (ICCV), and the Support Commands, logistic support to engineer units has been a constant worry to me. The Army logistic

CONFIDENTIAL

system is especially oriented to the high density item, to the beans and bullets, the jeeps, the rifles. It is not so good when low-density items are encountered, and it fails completely on nonstandard equipment. It would not be sensible to revamp the Army logistic system so that criteria of stockage would be based upon the lowest density item. We would then be buried in surplus stores. We need instead to recognize that low density items are a different breed of cat, and that for the very reason that they aren't large in numbers, it is even more important that the system should provide adequately for them. To be responsive, the system must handle these items differently from the great mass of logistics. Timely receipt of parts is absolutely essential to accomplishment of the engineer mission. In many instances, availability of a small but critical repair part -- required, for example to repair a rock crusher, asphalt plant, or 500 kw generator -- dictated whether the overall job would continue or a whole reinforced battalion would spin its wheels. At \$1.2 million per month, zero progress for a battalion, for lack of a 15¢ part, can get very expensive. The Army's demand data system is not to be condemned in general, but it does not have universal application. It does not work for low density items.³

In considering a possible special supply system for low-density equipment, the MCA LOC maintenance concept of vendor support and air shipment of repair parts would seem to be worthy of study, as a possible exception to normal requisitioning procedures to be used for low-density or nonstandard items. Another problem which is choking the system is the fact that so much of our equipment is worn-out junk. We keep it too long -- long after it should have been replaced. On this point the Chief of Engineers, General Clarke, has been a voice in the wilderness. He believes, and I am sure it could be demonstrated, if one took the time, that it would be good business for the Army to replace its construction equipment even as frequently as once each year, when operating on an all-out basis.

³Even for high density items, the demand data system as presently structured has great problems. It is just too complicated, considering the skill level, experience, and constant turnover of personnel involved at unit level in keeping the records and in requesting, storing, and issuing the parts. Perhaps demand data should be kept at depot or higher level. We constantly have to remind ourselves that at the end of the line, the main input into the fancy electronic machines is introduced by a man in greasy overalls, with a stubby pencil, working under adverse conditions.

CONFIDENTIAL

Certainly we should do so at some convenient definable point in time which would minimize higher echelon maintenance requirements. A civilian contractor finds it economical to do this, even when he is close to the sources of supporting parts and maintenance facilities. There is much more reason for the Army, operating 10,000 miles from the source of supply on missions which must not fail or falter, to replace its equipment regularly.

In any event, the procurement process should be accelerated and simplified to permit, especially in a theatre of operations, expeditious accomplishment of missions. The concept of competitive mass procurement for the whole Army is not always practical or economical. There is need for flexibility to buy equipment and spare parts on short notice, and move it by air to the job site. We should study the feasibility of a system of procurement whereby a successful contractor will provide equipment and maintain it at a minimum prescribed deadline level, replacing it as required, for a period of five years or so.

NEED FOR BETTER EQUIPMENT

The maintenance problems experienced in Vietnam with both TOE and MCA LOC equipment emphasize the appropriateness of some new approaches to procurement and maintenance of construction equipment. We seem to be so oriented on minimum investment cost that we pay no regard to subsequent maintenance costs. We spend a dollar on maintenance and overhead to save a penny on initial investment. Low-density equipment needs to be sturdier than its high-density counterparts. Too much engineer construction equipment is not designed for the punishment and hard use it receives. I asked a visiting major manufacturer why this was so, and he replied that government procurement specifications are written as broadly as possible to get the broadest base of competition. I have been required in past jobs involving contract procurement to broaden the "specs," as a result of the protest of some "bicycle shops," which wanted to get into the act. This is how we end up with junky equipment which meets the letter of the "specs," but fails in every other regard. Even the competent producers, to stay in the competition, are forced to "engineer" all of the resiliency and guts out of the machine to reduce production costs. Specifications should require durability, especially for overseas operation a long way from home base. It does not make sense to buy the cheapest rock crusher to operate 10,000 miles from home. • We should buy the most reliable one. Frequent breakdowns escalate production costs and overwhelmingly outweigh savings realized at time of

CONFIDENTIAL

purchase. One of my greatest disappointments has been the low reliability of critical construction equipment. I include in this category crushers, generators, asphalt plants, rock drills, graders, self-propelled compaction equipment, dozers, and rubber-tired tractors.

CONTRACTOR SERVICES

Another area, contractor services, deserves some discussion. The use of the civilian contractor in war is a relatively new concept. It has proven to be a good idea. Wherever a contractor can be employed, he should be used in preference to troops because he is cheaper in the absolute sense, and his use preserves the troops for those areas where contractors cannot be used. Contractors have been used successfully in Vietnam for major construction projects, facilities engineering, maintenance of equipment and as engineer consultants. We could and should have done more in this way.

THE ENGINEER SOLDIER

I can not write this report without saying something about the Engineer soldier. My hat is off to him. He is dedicated, hard-working and courageous; he is a good soldier. He puts up with adverse conditions and negative home-front attitudes without loss of sense of mission. He is responsive; he is intelligent; he knows why he is here; he is marvelous. However, he lacks the initiative or apparent will to take charge. Something seems to be missing from his training. Similarly, NCO leadership is wanting. Young NCO's are reluctant to "take hold" -- to enforce orders and policies. Perhaps they don't get enough leadership in the training cycle. Modern day training may be oriented more to the classroom, and less to the handling of men. There appears to be little practical instruction or practice in leadership. It is regrettable that we have given up close order drill without substituting something else. In close order drill, the chain of command, from the squad leader on up, exercised positive, man to man and voice leadership. We've lost that and there appears to be no substitute which similarly promotes the practice of basic leadership and confidence in command.

Commanders must work unceasingly to insure efficient operation of the chain of command. This is especially true in the Vietnam environment, where the problems of leadership are exacerbated by personnel turbulence. This whole area was given a tremendous shot in the arm by General Westmoreland's 7 April letter to officers and noncommissioned officers of

CONFIDENTIAL

the Army. The NCO's and officers were enthusiastic, and were encouraged by this articulation of leadership fundamentals at the highest level. The statement of NCO responsibilities, and guidance on NCO development, had a great impact on our NCO's, who implicitly believe, and were heartened by the reaffirmation of, the principles enunciated by the Chief of Staff.

Regarding the junior officer, the one in for two years, I think it a mistake to slam the door in his face once he leaves the service. We should allow him, if he is good, to return. More than that, the Army should actively "chase" after the best ones even after their release from active duty. Why not give the junior officer a 90-day option to return to the Army, with no loss in rank or seniority, providing his last commander so recommended.

MILITARY JUSTICE

I would like to say a few words about the adequacy and responsiveness of the military justice system. There is much written these days about the system of justice in the US being bogged down; the rights of society and the victim being submerged by the rights of the accused. This same complaint is echoed in the Army by our company and battalion commanders. The complaint is that this overly legalistic orientation toward protection of an accused regardless of the expense to society and the needs of society, has pulled the teeth of military justice. In order to contribute to the maintenance of good order and discipline in our units, military justice must be swift, positive, just and consistent with the seriousness of the violation. The soldier who commits a crime must expect to be punished. As an example, if a soldier can expect to get as a matter of routine a swift and realistic punishment in line with previously published allowable sentences, I would venture an opinion that the misbehaviors would be fewer. Frequently, while awaiting trial, the accused will commit further offenses that disrupt order and discipline in the unit. Swift punishment probably would cut the number of these situations.

The Military Judge concept makes the key man in a court-martial someone who has not experienced command, and who does not feel the responsibilities of command. A method must be devised to convey to the Military Judge an understanding of the commander's considerations and disciplinary problems. This procedure should be a relatively informal method and could be part of new post-trial sentencing procedures.

CONFIDENTIAL

CONFIDENTIAL

A further complaint by commanders is that the rules of search and seizure are not compatible with the Vietnam environment and the drug situation.

The long delays before and after trial lead to pressures to clear out the jail of all but the hardest criminals. This returns the "bad apple" to his unit where his presence indicates to other men an impotence of their commander to deal with infractions and protect their property and person. The delays do not end upon conviction in court; it often takes four weeks or more to get the sentence approved and the court-martial order published. Bottlenecks abound at every turn in the present military justice system. Something must be done to clear the legal and practical obstacles. Until this is done we will continue to have a result that is counter-productive and antithetical to good discipline. A simpler system is long overdue. We have to get away from long records, complicated search procedures, delayed trials, and overly legalistic judgments. Judges should be given more tools and procedures to assist in sentencing; for example, the Judge should receive a recommendation on sentencing from a field grade commander or from some other responsible source. In order to perform their mission of preserving good order and discipline in the Army, the Military Judge should be more attuned to the disciplinary needs of the military community he serves.

VIETNAMIZATION

A priority during my tenure as commander has been to further the Vietnamization Program. My program has been to continuously turn over responsibilities and projects to the proper Vietnamese agency as rapidly as it can assimilate those functions. In the LOC program, RVNAF Engineers have assumed responsibility for construction of certain segments of roads. Initially, those units were provided construction materials, to include mineral products, by US units. Gradually, we led the RVNAF toward performing their own supply function so that as of 1 July they are requisitioning and drawing construction materials through their depot system. We have also arranged for the turnover of industrial plants on a phased, firmly scheduled basis. MCA LOC equipment has also been phased into RVNAF Engineer units so they can gain familiarization with it and can learn how to employ and maintain it prior to our total stand-down. The biggest problem RVNAF construction battalions have now and will continue to have for some time, is adequate logistic support, primarily hauling supplies and maintenance of equipment. (The 52d RVNAF Construction Battalion, plus attached dump truck company, as an example, is

CONFIDENTIAL

already severely haul-limited in completing its section of QL-1, and had only 31 of 80 five-ton dump trucks operating in late June. Thirty of their dump trucks were deadlined for no tires.) The RVNAF and its MACV advisors are aware of the logistic deficiencies, and are working on these deficiencies. Logistic support, and not engineer talent, equipment or people, is the limiting factor in the readiness of the RVNAF Engineers to do their job. Based on our own experience, and on recent requests by RVNAF Engineer battalions to us to haul POL and construction supplies, there are going to be extensive problems in getting enough supplies to RVNAF Engineer units in the "boonies," at places such as Ban Me Thuot and Weigt-Davis. I caution the logisticians that good Engineer units use up supplies at a staggering rate. One of our battalions in the Delta consumed 3000 bags of lime a day, without mentioning the asphalt, POL, spare parts, etc. also needed to keep going. During my tenure of 13 1/2 months of command, the Engineer Command consumed two million bags of cement, one and one half million bags of lime, 600,000 drums of asphalt products, three million linear feet of reinforcing bar, 100,000 linear feet of bearing pile (almost 20 miles), two million linear feet of steel angle, and has had to keep operable 5000 major items of construction equipment scattered throughout Vietnam. This kind of operation is big business and requires staggering logistic support. If the RVNAF Engineers are going to be effective, their logistic support must scale itself accordingly.

The Advisor System.

The RVNAF Engineers have at least four different sets of military and civilian advisors who work on the LOC programs: (1) advisors to OCE construction battalions under MACJ4, (2) advisors to combat battalions under the corps senior advisors, (3) advisors to the Director General of Highways (DGOH) under MACDC-LOC and (4) advisors to the province officials under CORDS. It is desirable to coordinate the effort of all these advisors below the COMUSMACV level, and to review periodically the number of advisors needed by the RVNAF and DGOH. It is evident, even with all the problems, and shortfalls here and there, the Vietnamization program is going very well. More and more it is evident that the RVNAF rely on the US military less for advice and more as liaison to get help with supplies, equipment, and money when the RVNAF channels fail, or are slow to respond.

Technical Support.

For specific detailed technical support, the solution seems to be contractor employees such as Quinton-Budlong. COMUSMACV's decision

to combine the jobs of MACDC, USARV Engineer, and CG, US Army Engineer Command in one man will greatly facilitate the coordination of the Engineer missions, the Engineer advisory effort, and the Engineer operations in general.

It has been demonstrated that any particular aspects of engineering support can be provided by the various Vietnamese engineering organizations -- civilian and military, whenever they decide to put the necessary priority on this. They have performed magnificently wherever they set their hand to a task; the 1,100 meter, 59 span Tuy Hoa bridge is an outstanding example.

Turnover of Sophisticated Equipment.

Sophisticated equipment is hard to maintain. It demands skills which are scarce in Vietnam, and should therefore be avoided except where absolutely essential. As an example, low voltage power facilities should be the general rule and high voltage power, the exception. Sophisticated plants such as large cooling systems, power plants, water systems, sewage systems, etc., will be difficult to keep up once turned over. PA&E has trained Vietnamese civilians for almost four years; yet PA&E feels that none are qualified for the take-over operation of any of the more sophisticated plants. I am sure that the scarcity of skills is aggravated by the drain off of such personnel from the civil sector into the Armed Forces.

REDEPLOYMENT

I especially wish to express my admiration for the outstanding job done by USARV personnel administrators and logisticians to establish and execute smooth redeployment procedures. The job of out-processing personnel and turning in equipment could have been extremely sticky and complex. As it has turned out, outfits even from outlying areas have been able to redeploy in minimum time. This speaks well for the expeditious Keystone arrangements established for inspecting and receiving equipment and for processing personnel. There continue to be problems arising from the high security classification of redeployment plans. It is accepted that the classification is necessary, but we do pay a big price for this secrecy. Prior planning and preparations for phase-out of units and installations, and for realignment of missions are extremely difficult to carry out on a timely schedule.

CONFIDENTIAL**IN CONCLUSION**

Having put forth the above observations, I hasten to say that the United States Army in Vietnam has put forth an operation of unprecedented excellence. I don't believe the performance of the Army in Vietnam has been exceeded in any previous war for its professionalism, its dedication, and its steadfastness of purpose in the face of adversity and lack of popular appeal. This is also true of the Engineer effort, military and civilian. The above observations are meant to be constructive, and are put forth in the knowledge that some or all of them may not be feasible of accomplishment for good and sufficient reasons not known to me. If however, any are found to be valid, and useful in a future critique of the Vietnamese experience, this report will have served its purpose.

CONFIDENTIAL

CONFIDENTIAL**PART II: SUMMARY OF OPERATIONS AND ACCOMPLISHMENTS**

- A. Combat and Operational Support**
 - 1. Tactical and Rural Roads Program
 - 2. Lam Son 719
 - 3. Tactical Bridging
- B. LOC Program**
 - 1. Scope
 - 2. Progress
 - 3. Turnover of Roads
 - 4. MCA LOC Equipment
 - 5. Vietnamization
 - 6. Clarke Plan
 - 7. Bridging
 - 8. Aggregates
 - 9. Monsoon Construction
- C. Base Construction**
- D. Facilities Engineering**
- E. Vietnamization**
- F. Personnel**
- G. Redeployment**
- H. Outlook**

CONFIDENTIAL

CONFIDENTIAL**A. Combat and Operational Support****1. Tactical and Rural Roads Program.**

The tactical road program is directed and funded on an operational support basis. Until March 1971, the overall tactical road program was comprised of three similar, but independent, programs under the control and direction of each Military Region (MR) headquarters: XXIV Corps for MR 1, IFFV for MR 2, and IIFV for MR 3. At the present time, the programs in MR 1 and MR 3 remain active. The program in MR 2 assigned to US troops has been completed. There is no tactical road program in MR 4 assigned to US units at the present time.

In 1970, the construction agencies that participated in the program included the 45th, 937th, 79th, and 159th Engineer Groups, the 32d Naval Construction Regiment (NCR), various US divisional engineer units, and RVNAF engineer units. Since the redeployment of the 32d NCR and various divisional units, only the 45th and 159th Engineer Groups and RVNAF engineer units have actively participated in the program. A small portion of the work is being accomplished by Royal Thai Army engineers.

The primary purpose of the program is to support the tactical operations of US, RVNAF, and local Popular Forces. A secondary benefit is that these roads aid pacification efforts.

By June 1970, 246 km of the 1,305 km scheduled in the 1970 program had been completed. The completed road constituted only 19% of the total program. Several factors contributed to this, including disruptions caused by the Cambodian operation and monsoon rains.

In December 1970, the tactical road program had progressed extremely well in MR 3 with the entire 1970 program completed and 123 km of the 1971 program completed. In MR 1 and MR 2, however, the work was negated by rainfall intensity and heavy monsoon rain which in November 1970 caused considerable flood damage to the roads. An assessment of the damage to all these roads was determined by April 1971.

In developing the 1971 tactical road program it was determined that major efforts in MR 1 and MR 2 would be devoted to repairing and upgrading those tactical roads which had been damaged during the previous monsoon season. Very little effort was programmed for the construction of new tactical roads. For this reason, the 1971 program in MR 1 only included the upgrade of 238 km. No new program was established for MR 2. In MR 3, 523 km of tactical roads were programmed for construction.

CONFIDENTIAL

As of June 1971, 65 km of the 238 km in MR 1 had been completed. In MR 1, the remaining portion of the program will be completed by 1 October 1971. In MR 3, 405 km of the programmed 523 km has been completed. The remaining portion of the MR 3 program is under continuing review, due to the changing strength of both US security forces and US engineers, resulting from redeployments.

The rural roads program, formerly known as the secondary roads program, is under the direction and control of MACCORDS. It is active in all four MR's and is funded through USAID. The construction agencies for this program include the Ministry of Public Works and RVNAF engineer units. A small portion of the work is being accomplished by local Vietnamese contractors. This program is coordinated at MR level by MACCORDS representatives to insure integration with the tactical road program. The primary purpose of this program is to aid pacification with the secondary purpose to support tactical operations of RVNAF and local Popular Forces.

The 1970 MACCORDS rural roads program included a total of 1,197 km of road to be either restored or constructed. In December 1970, this program was 92% complete with a total of 1,097 km of road completed. The work remaining in the 1970 program was rescheduled into the 1971 program. The 1971 rural roads program consists of 770 km, 97 of which have been completed as of June 1971.

The construction of these roads provides a basis for further development of a lines of communication (LOC) network throughout Vietnam. The redeployment of US forces will preclude any large tactical road program for 1972. However, the MACCORDS rural roads program provides the foundation for a GVN program which could accomplish the following:

- a Upgrade of main secondary roads to insure continued economic and population growth of outlying areas.
- b. The construction of additional roads to open new areas to settlement.

25

CONFIDENTIAL

c. The recovery of tactical bridging from existing roads and the replacement of these bridges with permanent bridging. The recovered bridging could then be further utilized on new roads.

d. The expanded use of local Vietnamese contractors to perform this work. This would aid in the development of a civilian construction capability in Vietnam.

2. Lam Son 719.

The importance of including the Engineer in the initial planning phase was demonstrated in Operation Lam Son 719. In this operation, the Commanding Officer, 45th Engineer Group, participated in the "close hold" planning. As a result, a task force involving two non-divisional battalions and elements of a divisional battalion opened QL-9 to Khe Sanh in less than 36 hours, constructed an assault strip at Khe Sanh in 14 days and on Highway 9 placed thousands of gallons of penprime and hundreds of feet of bridging. On the first day of the operation, 116 sorties were flown for the engineers alone. Lam Son 719 required the establishment of a forward resupply airfield, and the existing airfield at Khe Sanh was selected. Reconnaissance revealed that extensive repairs were required to the existing AM-2 matting. To preclude delays, XXIV Corps decided to construct a new assault strip at Khe Sanh in conjunction with the repair of the old field.

The new strip was constructed of MX-19 matting. The field was 3,232' x 60', nearly 700' shorter than the existing runway. Work on both strips was begun on 1 February 1971 and the first traffic landed on the new assault strip on 15 February 1971. Aluminum matting was selected for the new strip because of its durability, ease of installation, and light weight. The latter was especially important because transportation was critical.

Although we have contingency bridge stock on hand, we did not have contingency airfield matting stock in sufficient quantity. Security prevented movement of the required airfield material into country in advance of the operation. The need for contingency stockage is clear and stockpiles of matting are now being established.

3. Tactical Bridging.

Like any other construction material, tactical bridging is an important contingency asset. To preclude the possibility that tactical bridging

CONFIDENTIAL

CONFIDENTIAL

26

would be inadvertently retrograded, Engineer Command initiated action in April 1971 to retain all tactical bridge sets in RVN. In May, Department of the Army concurred.

The redeployment of US units is placing greater responsibilities on RVNAF for contingency bridging. In three recent cases of enemy interdiction, the reaction of RVNAF Engineers was encouraging. Their rapid response in employing their contingency stockage reopened the road to traffic in a short period of time. A proposal to transfer contingency requirements throughout RVN to RVNAF is being developed by the Engineer Command. A portion of US contingency stocks would also be transferred to RVNAF to store and maintain.

In mid-1970, a complete inventory and classification of bridge assets in depots was completed. This enabled a distribution of available assets to meet the contingency requirements established by the major tactical commanders while at the same time cancelling requisitions found to be unnecessary as a result of the inventory, at considerable savings to the government. In November 1970, the supply of M4T6 pontoons became critical. Repair of unserviceable pontoons was determined to be much more economically feasible than the purchase of new pontoons; accordingly, a contract was awarded. As a result, 343 pontoons were repaired at a savings of more than \$700,000. This method has been recommended to MACV for repair of RVNAF assets.

B. LOC Program

1. Scope.

The LOC program is a program to provide the Republic of Vietnam with a 4076 kilometer, modern interprovincial highway network. In general, the roads follow the alignment of the national road network established by the French in the late 1930's and early 1940's.

The responsibility for construction was assigned to US Army and Navy engineer forces, the US contractor, and RVNAF engineer units. Some segments of the program were classed as deferred due to a lack of construction funds. Responsibility for construction was shifted between responsible agencies between June 1970 and the end of July 1971 because of changes in available assets (primarily the increase in RVNAF capability and the reduced US Army capability because of redeployments). A tabulation of these changes is as follows:

20

CONFIDENTIAL

CONFIDENTIAL

<u>Construction Agency</u>	<u>KM June 1970</u>	<u>KM June 1971</u>	<u>KM Change</u>
Army	2481	1602	-879
Navy	427	391	-36
CPAF Contract	960	1054	+94
RVNAF	165	537	+372
Deferred	<u>43</u>	<u>492</u>	<u>+449</u>
	4076	4076	

2. Progress.

A milestone will be reached in October 1971 upon the completion of the US portion of QL-1. The entire length of Vietnam's principal highway from Saigon to north of Quang Tri will be finished with the exception of a 40 km stretch due for completion by RVNAF in December 1971.

Overall since last June engineer troops have completed 314 km of new roads. An additional 442 km of roads reported previously as completed were improved by necessary repairs and the addition of shoulders prior to turn over to the Director General of Highways (DGOH).

Another milestone during this period was the completion of the first portions of the RVNAF program. RVNAF completed 64 km and showed that they are capable of building high quality highways.

The LOC program now has 2379 km completed, which is about 66% of the undeferred portion of the program.

The progress on our road construction was repeatedly hampered and interrupted by break-downs at our industrial sites, especially at the crusher sites. It has been difficult to keep the crushers operational the amount of time necessary to support the roads. The unreliability of generators and lack of back-up float and repair parts to operate the crushers have been particularly vexing.

CONFIDENTIAL

In the periods when full output was attained from our industrial sites, the bottleneck returned to the shortage of haul capability. Maximum use of contract haul and frequent redistribution of equipment were used to mitigate haul inadequacies.

This particular situation of having several items on or close to the critical path has compounded the need for astute management of resources particularly at the company and battalion level, and at the levels of group and above. The "stove pipe" organization of the Engineer Command facilitated such management and redistribution of resources.

In order to complete the maximum amount of high quality road in the minimum time, we sought waivers, with regard to width of shoulders and alignment, wherever excessive amounts of construction effort were involved to meet the Combined Central Highway and Waterway Committee (CENCOM) standards.

3. Turnover of Roads.

In the early stages of the LOC program the objective was to get as much paving done as possible in order to reduce the threat of mines and to facilitate military use during monsoon weather. As the important supply routes were completed, we have been able to devote more attention to improving the quality of roads. Thus a major objective during the past year has been to make necessary repairs and to add shoulders to roads, previously reported as completed, in order to turn the roads over officially to DGOH. Additionally, all new roads have been turned over in increments as they have been constructed.

This program has served two purposes. The required joint inspection prior to acceptance by DGOH has undoubtedly inspired greater quality of construction. Secondly, the transfer of roads has provided for a phased acceptance of the maintenance responsibility by DGOH, a necessary step to achieve long range benefit from the LOC program. Since June 1970, the amount turned over by Engineer Command troops has increased from 157 km to 990 km. Including contractor and Navy, the total turnover has increased from 736 km to 1755 km.

CONFIDENTIAL

4. MCA LOC Equipment.

The 733 items of commercial construction equipment purchased for the LOC program have been a major contributing factor in the success of the program. These items have increased production by over 50% and in some cases have overcome critical equipment deficiencies that would have halted production. In retrospect, it would have been beneficial to have procured larger numbers of such items as dump trucks, compaction equipment and water distributors. This shortage of selected equipment is now being overcome by concentrating these items in remaining battalions as units complete their LOC missions and are redeployed, but valuable time and effort have been lost over the past year because of such shortages.

As the US units are being phased out, this equipment will be made available to RVNAF units and also to local contractors who will construct a portion of the LOC as part of the Clarke Plan.

The idea of costing equipment to a project is a good one. The present TOE's are simply not designed to permit large scale construction like the LOC program, and the present system does not provide for direct substitution of commercial construction equipment for TOE equipment. The MCA LOC concept offers an alternative. An evaluation of the MCA LOC equipment is contained in Part III.

The method of providing a maintenance service by civilian contractor has proven to be necessary and workable. The addition of MCA LOC equipment requires additional mechanics (1) to absorb the increased maintenance workload and (2) to provide the skills needed to maintain nonstandard equipment. This system is especially applicable where there is rapid turnover of military personnel and the equipment to be maintained is nonstandard and low density. The maintenance function can be accomplished by civilians, allowing the release of soldiers to more combat-related roles. It has been shown to be a workable solution even in an actively hostile environment.

A special, separate repair parts supply system was established for the MCA LOC equipment in conjunction with the maintenance contract. This system has been more or less effective, and can be more responsive to user needs than the normal Army system. Where the Dynaletron support was less effective, it appears that the problem was managerial. Where a weak lead foreman was in charge, support was marginal or poor and we were obliged to ask for a change. Where a strong lead foreman

CONFIDENTIAL

was in charge, maintenance support was good. It is basically a mail-order system. The part requirement is phoned or mailed to a purchasing agent in CONUS; purchase is made on the open market; the parts are mailed or forwarded through military transportation to the requestor. The system is extremely flexible, utilizes direct relationships between the requestor and the buyer, depends on adequate communications systems and ability to use various modes of transportation, and provides repair parts in a much more responsive manner than the conventional Army supply system.

Two additional purchases of 56 end items of commercial construction equipment were made. The experience gained from these buys suggests the need for careful planning, and a thorough understanding of the situation by the procurement personnel involved.

The first shipment, of 56 International dump trucks, introduced a new make and model into the program. These trucks were also a new model for the manufacturer, and the supply of repair parts was not developed and distributed throughout CONUS. The initial overpack did not contain parts needed for initial repair, and in some instances the parts provided were not for the model truck purchased. In making follow-on purchases of commercial equipment, for items similar to those already in the system, every effort should be made to duplicate the make and model of the previous equipment. Also, much more care is needed in determining what should be included in the initial overpack; this is underscored by the fact that of the repair parts now in stock for MCA LOC equipment, over three quarters of the items contained in initial overpacks have not yet had a demand made on them.

A recent shipment of 56 additional pieces of MCA LOC equipment will allow RVNAF engineer units to match the output of US units. This shipment correctly duplicated make and model of items previously in the system. However, it has been difficult to keep track of this shipment because of improper shipping instructions. This equipment was to be utilized by RVNAF units, but to be accounted for and maintained by US forces. All items were addressed to and delivered to RVNAF depot facilities, and it was only through the diligent individual efforts of advisor and Engineer Command personnel that they were located, identified, and brought back under US control. Equipment that is to be utilized in a US program, and to be accounted for under US procedures, should be delivered to an in-country US unit which will then be responsible for providing it to local forces.

Our experience with the MCA LOC equipment in Vietnam has been generally satisfactory. The equipment, for the most part, has given us a much greater capability and more versatility. The equipment can be adapted to all engineering construction requirements that we have encountered. In the future, maximum use should be made of commercial equipment to supplement the Army inventory. More flexibility is needed, however, to purchase this equipment expeditiously, to meet the requirements of new construction missions or to replace equipment which is scored out.

5. Vietnamization.

Our objective has been to increase the RVNAF participation in the LOC Construction Program as rapidly as they were able to assume increased responsibility. Milestone dates were as follows:

<u>DATE</u>	<u>COMMITMENT</u>
Oct 69	Build 165 km of LOC
May 70	Produce Asphaltic Concrete at Gia Ray
Jul 70	Build 353 km of road
Sep 70	Produce Asphaltic Concrete at Soc Trang
CY 70	Build 2416 m of bridges
CY 71	Build 1592 m of bridges
Jun 71	Produce rock at Nui Le
Sep 71	Produce rock and asphaltic concrete at Ban Me Thuot and Weigt-Davis

In October 1969, the ARVN agreed to construct a total of 165 km of highways. The road segments for which they accepted responsibility were as follows:

1. QL-1 Tuy Phong - Ap Long Lam - 50 km
2. QL-1 Gia Ray - MR 2/3 Border - 65 km
3. QL-4S Soc Trang - Bac Lieu - 50 km

To accomplish this task, three RVNAF battalions (52d, 61st, and 71st), three heavy equipment companies, and three dump truck companies were committed to the LOC construction program. Initially mineral products, asphaltic concrete and other construction materials were provided by US units. Gradually RVNAF has assumed responsibility for industrial products. First was the production of asphaltic concrete at Gia Ray in May 70. In September 1970, the Soc Trang plant operated by RVNAF began producing asphaltic concrete for QL-4. The Soc Trang plant provided some asphaltic concrete to the US 69th Engineer Battalion. In July 1970, two additional RVNAF Engineer Battalions were committed to the LOC program. The RVNAF 65th Construction Battalion was assigned to build QL-14 from 25 km north of Ban Me Thuot to Dao Thong, and the RVNAF 202d Combat Engineer Battalion was given the responsibility of building LTL-7B from QL-14 to Cheo Reo. At this time, RVNAF also accepted responsibility for TL-2B, from QL-1 to Ham Tam, LTL-2, from QL-1 to Phuoc Le, and LTL-8A, from LTL-27 to Rach Gia. This commitment brought the total RVNAF responsibility to 518 km with 64 km having been completed as of 1 June 1971. In addition to roads, RVNAF agreed to build 39 bridges with a total length of 2416 meters in the CY 70 program. Thirteen (13) bridges with a total length of 1592 meters have been completed. The CY 71 program included 71 bridges of which five have been completed. The RVNAF program includes eight prestressed bridges one of which is partially completed.

The next step in the Vietnamization was to transfer responsibility for production of crushed rock to RVNAF units. Three industrial sites are presently scheduled to be turned over to RVNAF. The first of these sites, Nui Le, was turned over for operational control to the RVNAF 52d Construction Battalion on 1 June 1971. The next site to be turned over is the Ban Me Thuot site which will be transferred on 1 September 1971. This site will be operated by units of the RVNAF 65th Construction Battalion to support construction on QL-14. The Weigt-Davis site is also to be turned over on 1 September 1971, and will support construction on LTL-7B and QL-14. The RVNAF 202d Combat Engineer Battalion will operate the site. The responsibility for logistical support of these industrial sites is divided between a contractor, a US detachment, and

CONFIDENTIAL

RVNAF. The contractor will maintain MCA equipment. A US construction support detachment will maintain non-TOE equipment and will requisition drill steel, bits, and explosives until the RVNAF are able to requisition these items through their supply system. The RVNAF will maintain their baseline equipment. Advice and assistance for the operation of the industrial sites will be given by a US engineering consultant. The US detachment will phase out of the support role as the RVNAF are capable of operating and supporting the site, but not later than 1 July 1972.

Until 1 July 1971, RVNAF units obtained construction material through the affiliated US battalion. This system of supply had the effect of putting the RVNAF battalion in competition with a US battalion for the same material. When materials became critical the RVNAF battalion often did not get what it wanted. RVNAF units are naturally reluctant to start on their jobs until all the required material is available. Another difficulty with this system existed when the RVNAF bill of materials (BOM) appeared excessive. Since the US unit had no authority to review the BOM, it was forced to either issue what appeared to be excessive amounts of material or issue only what it thought were adequate amounts. This usually caused ill feelings between US and RVNAF units. Under the new supply system the RVNAF will requisition the necessary supplies through their own system. This will provide a more appropriate method of supply for RVNAF construction projects.

RVNAF engineer units have encountered the same problems as the US LOC battalions. For example, there is a lack of adequate LOC construction equipment to build roads. The 56 items of MCA LOC road construction equipment, previously mentioned, are presently being issued to RVNAF LOC construction units. Included are compaction, water distribution, and welding equipment. As additional equipment becomes available from US units completing their LOC projects, it will be transferred to RVNAF. All MCA-purchased equipment will be maintained by the maintenance contractor, Dynalectron.

The RVNAF units have demonstrated that they are capable of building roads and bridges as well as US units given the proper equipment and logistic support. One of the most formidable problems confronting the RVNAF engineers is maintenance of equipment. The principal problems appear to be supply of repair parts and training of mechanics and operators. The bolstering of their maintenance capability should be of first priority. One way of doing this is to contract for the rebuild of major components, such as engines, generators, and rock crushers.

CONFIDENTIAL

The RVNAF have taken over portions of the construction and support responsibility during the past 1 1/2 years. This has been a slow and methodical process. Due to the present Vietnamization policy, this responsibility must be shifted to RVNAF at an accelerated rate.

6. Clarke Plan.

Lieutenant General F. J. Clarke, during his November 1970 visit to Vietnam, suggested switching a number of LOC projects in the Delta from troop to Vietnamese contractors. This plan has the advantage of releasing US engineer units for earlier redeployment, and it should help foster a road construction industry in Vietnam, as similar programs did in Korea and Okinawa. Additionally, there is an overall savings of money since the cost of the contractor will not be as high as the cost of keeping the engineer battalions in Vietnam the necessary time to complete the roads. The initial proposal provided for the contractor to take over the construction of 113 km of road, thereby releasing three US engineer battalions. This would have saved 26 battalion months in Vietnam when considering estimated completion dates of these units. Because of the difficulty in obtaining funds for implementing the plan, the scope was reduced to 83 km at an estimated cost of \$16.0 million. Under this version, one battalion will be released from construction as originally scheduled and the other two battalions two months later. This saves 22 battalion months in Vietnam, which is an estimated \$26.4 million savings. This figure is based on a Department of the Army study showing that the cost of keeping a construction battalion in Vietnam is \$1.2 million per month.

During his visit in April 1971, the Secretary of the Army was briefed on the desirability of this program. Subsequently, Department of the Army provided \$9.3 million to go with \$6.7 million already programmed from MACV sources. On 12 June DOD advised that the Clarke Plan was approved.

One note regarding approval of the Clarke Plan. It is taking us eight months to implement the plan, and everyone was for it. The delay was in the unnecessary reference to higher authority to get a decision. This recourse to higher and higher authority should not be necessary for small changes in method.

CONFIDENTIAL

Planning has already started for obtaining the Vietnamese contractors. A prototype contract previously approved, consisting of 8.9 km of LTL-27, is being awarded and has attracted five contractors. Plans and drawings for the 83 km of Clarke Plan roads are being prepared. Certain items of equipment from the three engineer battalions being released will be made available for use by the contractor. Bridge piling and stringers, already ordered for troop construction of the bridges along these routes, will be stockpiled in the Delta for use by the contractor.

While the long range benefits of this program are promising, short range problems are apparent. Local contractors lack managerial skills, capital, and technical ability. It is anticipated that these shortcomings will cause contractor defaults in the early part of the program until a nucleus of qualified contractors is developed.

7. Bridging:

In support of the LOC program, 714 bridges are to be constructed throughout RVN. Since June 1970, 49 of these, totaling 5,119 meters, have been completed to include the longest bridges constructed by US and RVNAF engineers, the 500 meter Bong Song and the 1100 meter Tuy Hoa bridges. The majority of the bridges have been constructed of standard wide flange sections and 36" built-up beams; however, six of the bridges are to be constructed of locally manufactured prestressed concrete beams. The first of these is scheduled for completion in August 1971. Of the 313 bridges remaining to be constructed, 25 are underway at the present time. The Vietnamese have demonstrated their desire and ability to build bridges. The 59 span, 1100 meter bridge south of Tuy Hoa is one example of their capability. Unfortunately their logistic system cannot cope with the heavy demand. One problem that has been observed is that RVNAF engineers do not forecast logistic requirements.

8. Aggregates:

The production of our rock crushers was seldom able to keep up with needs of the LOC battalions during the construction season. A battalion needs approximately 5000 cubic yards of aggregate to construct a kilometer of road each week. Few of our quarries were consistently able to meet this goal as shown by the following:

CONFIDENTIAL

<u>QUARRY</u>	<u>CRUSHERS</u>	<u>AVG WEEKLY PRODUCTION IN CUBIC YARDS (JAN-JUN 71)</u>	<u>BATTALIONS SUPPORTED</u>
Nui Le	250 TPH Cedar Rapids 225 TPH Pioneer	6,519	169th, 52d ARVN
Weigt-Davis	Two 225 TPH Pioneers	3,306	20th
Banana	400 TPH Plant 75 TPH Eagle	10,118	169th
Vin Hao	250 TPH Cedar Rapids	5,094	589th, 61st ARVN
Bao Loc	250 TPH Cedar Rapids 75 TPH Eagle	4,377	554th
Dillard	250 TPH Cedar Rapids 225 TPH Pioneer	4,595	815th
Vung Tau	400 TPH Plant 250 TPH Cedar Rapids Two 225 TPH Pioneers Two 75 TPH Eagles	13,475	Delta
Don Duong	250 TPH Cedar Rapids	4,114	577th
Khanh Duong	250 TPH Cedar Rapids 75 TPH Eagle	2,225	Task Force Sierra
Whiskey Mtn	250 TPH Cedar Rapids 75 TPH Eagle	5,665	864th

The TOE 75 TPH Eagle crusher is used at some sites to produce limited quantities of special products. Seldom was 50% of the rated capacity of the equipment achieved.

The principal cause of non-productive time was deadlined equipment -- crushers, generators, air compressors, and track drills. Crushers deadlined for low density repair parts not on hand in-country were frequently out of action for a month or more. An extreme example is the 300 roll crusher at Vung Tau which was deadlined for over a month awaiting a \$1.50 heater coil for the starter switch. Many times a piece of equipment was down because an overhauled engine was not properly assembled and would last only a week or two.

The crusher equipment in Vietnam is not sturdy enough to stand the punishment and abuse it receives. It is not "soldier proof." It requires too much maintenance.

Our whole concept of producing aggregates for major road projects needs to be re-examined. Possibly, we should have relied upon contractors to produce aggregates. On the other hand, if troops are to produce rock, in far-off places, we need better equipment, a better maintenance system, better trained operating and maintenance personnel and adequate funds to replace worn out equipment.

9. Monsoon Planning.

The monsoons require a change in construction methods to suit the weather. One must take certain measures to minimize the deleterious effects of the monsoon; for example, one should remove quarry overburden during dry weather. Operations must be modified to work with the weather whenever possible and to avoid crippling drainage problems during wet weather. With two monsoons having different effects in different parts of the country, it is possible to switch engineer effort depending on where the rain is.

Wet weather construction in the Delta has involved some procedures worth comment. Clay-lime or sand-cement stabilization, successfully used in dry weather, is inefficient in the monsoon because clay borrow pits are flooded, and sand stockpiles are saturated. Sand-asphalt is a relatively inexpensive answer. Dredged sand is put through a drier, four to five percent asphalt (AP-3) is added, and the mixture replaces clay-lime or sand-cement as a subbase. The mixed product may be stockpiled 24 to 48 hours, depending on temperature (the higher the temperature, the longer one may stockpile). It may be laid with a grader or Jersey spreader, the latter being preferable for thicker lifts. The vibratory compactor seems to do the best job in compacting sand-asphalt.

Ordinary crushed rock base course may be used during dry weather in the Delta, but black base seems preferable in wet weather because it provides a waterproof seal. When the ordinary base course gets too wet, one has the obvious compaction problem. Also, rains will wash out the fines. With black base these problems are avoided. Base course is run through a drier, four to five percent asphalt (AP-3) is added. (The screeps are removed; gradation control is not required.) Black base is most successfully laid down with a paving machine, but the Jersey spreader

CONFIDENTIAL

or blade laying may also be used. Compaction is the same as for asphaltic concrete: a steel-wheel breakdown roller followed by a rubber-tired roller.

C. Base Construction

A new focus of effort in base construction derived from the recognition that with decreasing numbers of US troops, facilities must be consolidated and made more efficient and that morale and recreational facilities must be expanded. In general, new base facilities were to cater to bedding down in-country redeployments, to reduce and consolidate functions, and to improve welfare of troops.

During late 1969 and early 1970 a series of continuing disturbances occurred at the Long Binh stockade. Inmate grievances centering around substandard living and safety conditions. To overcome these deficiencies and to provide increased security, a new stockade and maximum security facility were needed for a projected inmate population of approximately 350. While a contractor's estimate of \$1.17 million was under consideration, engineer troops in late July 70 began the construction of the maximum security facility and continued the entire project to its completion on 1 July 1971. This sophisticated modern cement block facility is another testimony to the ability of engineer troops to mobilize rapidly and accomplish a task in a professional manner achieving results comparable to those achieved by an experienced contractor.

A new commissary sales store and warehouse complex was constructed at Newport to replace the rented commissary, in Saigon, the lease of which was not being renewed. In addition to being on rent-free real estate, the Newport store would provide for increased food handling efficiency from ship to store to customer. The \$0.922 million project of pre-engineered structures which was completed by the CPAF contractor on 26 June 1971 provides 28,000 square feet of commissary sales store and 24,000 square feet of warehouse.

Religious retreat centers have met with success in Germany and Korea. The USARV Chaplain requested such a facility for US forces in Vietnam as one method for improving troop morale during the period of US redeployments by providing an in-country facility to meet, relax and discuss common problems. Engineer troops were committed as the most responsive construction agency to assure early occupancy. The renovation of 11 existing structures at Cam Ranh Bay was completed on 15 July 1971 at a cost of \$75,000.

The growing concern with drug abuse in Vietnam resulted in a positive program to identify and detoxify users. Existing facilities at Long Binh and Cam Ranh were rehabilitated and expanded for 200 and 300 patients, respectively. Work, which was begun in mid-June using engineer troops and contractor, was completed at the end of July at an estimated cost of \$156,000.

Hand-in-hand with the concern for the identification and treatment of the drug abuser was another program aimed at prevention. Sports areas were to be provided to combat boredom which had been identified as contributory to the use of drugs, and to provide for a real need for recreation. Facilities at Long Binh, Can Tho, Binh Thuy and Chu Lai include basketball, tennis, volleyball and handball courts. Engineer troops and contract have been used for the \$315,000 program. Those facilities that have been completed are enjoying good use well into the night.

MACV advisors are located at many small sites. These locations change as the RVNAF units redeploy in country as a consequence of US redeployments to CONUS. To provide proper living conditions at these generally isolated facilities, an upgrading program was begun in early 1969. Some 216 sites at a cost of \$4.7 million were involved in a contractor and engineer troop effort.

The USARV Facilities Review Board reviews all requests for new construction, to avoid non-essential construction. Thus it conserves not only engineer troop construction effort, but also materials and contract construction funds. During FY 71, 109 MCA projects were reviewed and only 34 were recommended by the FRB at an estimated cost of \$4.1 million. The 75 disapproved projects had a value of \$20.7 million. The board additionally approved 183 minor new construction projects with an estimated cost of \$1.4 million while disapproving 128 with an estimated cost of \$0.574 million.

D. Facilities Engineering

The principal method of providing facilities engineering support in Vietnam has been through the use of contractor effort. This approach has been in effect since 1964 when it was determined that overriding requirements for military personnel in field operations would preclude support with troop units. The major advantages which have accrued from this method of support have been continuity of management and a continuing upgrading of technical ability. In addition and perhaps of more long range significance has been the development of a wide base of

technical skills among the Vietnamese civilians employed by the contractors. Recent efforts toward upward mobility of local national (LN) employees should result in the development of a middle management capability among the Vietnamese. The trend toward utilizing Vietnamese in an increasing number of management-type activities is resulting in a diminished requirement for Third Country Nationals (TCN). It is anticipated that by the end of FY 73 only those TCN's with highly specialized technical skills will remain.

During FY 71 and FY 72 three contractors, Pacific Architects and Engineers (PAE), Vinnell Corporation, and Philco-Ford, have been providing the required facilities engineering support to the Free World Military Assistance Forces, less the U.S. Air Force. Philco-Ford assumed the support requirements for the Da Nang - Chu Lai area in FY 71. PAE provides support for the remainder of Vietnam, and Vinnell Corporation shares operation and maintenance of the high voltage electrical system with PAE.

The current method of contracting for facilities support is through the use of sole source cost-plus-award-fee (CPAF) contracts. In addition, a cost incentive feature was introduced in FY 71 which provides additional fees based upon improved performance and contract savings. This feature has resulted in a definite upgrading of contractor performance during FY 71. One change is suggested to the method of contracting for facilities engineering support. At present, the contractor is entirely dependent upon the Army for all logistic support. For items readily available within the Army system, this is appropriate. However, as in the case with Dynalelectron in supporting nonstandard (MCA) equipment, it would seem appropriate to allow the contractor to purchase items which are low-density or nonexistent in the Army system. This would tend to expedite receipt of supplies.

Budget reductions for the Engineer Command (\$30.2 million in FY 71) required USARV to accept a reduced level of contractor-provided services at the installation level. This has resulted in additional deferred maintenance and an increased reliance on troop self help. By 30 June 1971, base closures had reduced requirements sufficiently to enable the Engineer Command to live within the budget at the reduced services level. An additional \$16.8 million would have been required to provide support at the level prescribed in the AR 420 series.

Although overall support in the mission area has been successful, there are problems. One problem, that of procurement procedures, should be evaluated and alternate methods formulated. Basically, the command has been required to follow all normal CONUS procurement regulations. This strict adherence to a somewhat inflexible system has resulted in less than responsive support on occasions. Greater flexibility should be permitted in a theater of operations. This need for flexibility is emphasized during phase down by budget restrictions, base closures, real property maintenance training for RVNAF, and increased contractual effort to include immediate response to command priority requirements.

A vast complex of temporary installations consisting of approximately 180 major bases and over 500 minor bases was constructed to house the large number of troops initially sent to Vietnam. Some pre-engineered metal buildings, high voltage power and underground utility systems were installed, but for the most part temporary timber construction was provided. As the US forces withdrew from RVN, these excess base camps were transferred to RVNAF to enhance the Vietnamization program.

The transfer of facilities was completed in accordance with peacetime procedures, specifically AR 405-90 and implementing policies from USARPAC, MACV and USARV. An elaborate procedure was established to report excess facilities through coordinator channels to MACV where coordination was effected with RVNAF, GVN and other US services. This process required several months and involved complicated planning and execution of transfers. Great emphasis was placed on maintaining a complete and continuous audit trail. After MACV authorized the transfer, Engineer Command approved the Form 337's for each facility and the facilities engineer contractor transferred the property to the new owner by Form 1354. Damage to US facilities was accounted for by report of survey.

Prior to the first transfers, US troops stripped facilities and relocated equipment to new bases. RVNAF troops also stripped facilities. Constant command emphasis by US and RVNAF brought this problem under control. As RVNAF planned to occupy the initial facilities transferred, it was necessary to protect them for prolonged periods to insure usable condition. After RVNAF requirements have been satisfied, some bases are transferred to be dismantled.

The US recovered sophisticated equipment and high dollar items prior to transfer. Simple low voltage generators were substituted for high voltage systems. This substitution prevented overloading the

RVNAF logistical system and retained valuable equipment for US units. A study was made to determine the economics of retrograding typical facility components. Although many components could be economically retrograded, security needs, time, and engineer effort had to be considered.

USARV is responsible to insure continuity of operations at transferred bases. This mission required an extensive RVNAF training program which included providing tools, manuals, and repair parts for equipment.

In many cases, facilities had deteriorated before the US was ready to leave an installation. Procedures were established to sell unusable facilities as standing scrap through PDO. Vietnamese contractors offered approximately 7 - 10% of initial acquisition value for old wooden buildings and the US was saved the expense of removal.

The base transfer program was hindered by strict US security which prevented coordination of base transfers well in advance and by a CONUS-type property disposal system that cost more to manage than some of the property was worth. In spite of these drawbacks, the property was transferred in a systematic manner to the Vietnamese agency designated to accept it.

It has been the objective of the US Army Engineer Command to reduce the number of leased facilities formerly held by US and Free World Military Assistance Forces and consolidate units and organizations into rent-free facilities, consistent with operational requirements. During the period 25 June 1970 through 30 July 1971 there has been a net reduction of 148 leases and a total reduction in annual rent of over \$2,200,000. While troop strength has been cut drastically in the last year, the number of garrisoned troops has remained static and in some instances has increased in areas such as Da Nang, Saigon, and Can Tho where most of the US leaseholdings are concentrated. The program to reduce the number of leaseholdings has been facilitated by the use of utilization surveys. Each leased facility is surveyed once each year to determine the adequacy of space utilization. Copies of the surveys are given to the local area coordinator along with appropriate recommendations to effect consolidation of leased facilities wherever possible. Other actions taken to reduce lease and associated costs were:

- (1) Full utilization of facilities
- (2) Relocation of activities to rent-free facilities

- (3) Reduced American presence in Saigon
- (4) Negotiations of contracts for utilities
- (5) Conservation of utilities

Through command letters the zone coordinators have been informed of the leasing and utilities cost associated with their areas of responsibility. Utilization studies have pointed out to commanders those leased facilities that could be terminated by consolidation into other leased or rent-free facilities. The zone coordinators actively supported this program. Coordination with US Army Procurement Agency Vietnam resulted in insuring that the US Government obtained the lowest available rate from utility companies. Formalizing utilities contracts resulted in standardized billing procedures saving administrative processing time. Utilities conservation received continuing command attention. Demands for power increased with the US Army buildup in RVN. This demand was met through the use of low voltage distribution systems and the construction of 36 high voltage land-based plants augmented by 11 power barges at coastal locations. In 1967, the Engineer Command assumed responsibility for power procurement within country.

Low voltage power generation support is currently provided by the facilities engineering contractors throughout the Republic of Vietnam. The closed loop support system in use has not provided low voltage generators at a sufficient rate to satisfy new requirements and the replacement of units retrograded for rebuild. The resulting shortage is currently impacting on operations. Actions are being coordinated to correct the problem. However, the support system should be analyzed to determine improvement which if implemented would insure adequate response under all circumstances.

High voltage power is used at the larger, built-up areas. The redeployment of US troops from RVN has created a need to reduce power at some locations while consolidating, maintaining, or increasing power production at others. Because of high operating costs, five T-2 power barges have been removed from service and the remaining six are scheduled to be withdrawn this calendar year. Two land-based plants have been removed and three plants have been transferred to RVNAF. Plans are being processed by a MACV Joint Planning Group to determine future RVNAF requirements. Plans are also underway to increase the power capacity of the plants at MACV #2, Dien Hoa and Can Tho. Consolidation of power production at Da Nang will permit the return of the MUSE generators to the Navy.

Facilities engineering support in Quang Tri Province increased during February and March 1971 due to Lam Son 719. Electrical power generation, water production and fire protection support were significantly upgraded during this operation.

As combat operations have decreased, requests for air conditioning of all types have increased. Efforts to control and utilize existing assets are continuing, in order to minimize requirements for new air conditioners. Because of the wide variety of nonstandard items in use, repair parts are a continuing problem throughout RVN.

E. Vietnamization

An energetic training program was undertaken during 1970-1971 to develop a skilled force of RVNAF engineers. Primary emphasis was placed on LOC construction, industrial site operation, facilities engineering, land clearing operations, and mapping and topographic training. Vietnamization training has been conducted in two basic forms: (1) on-the-job training with US units and (2) mutual association of RVNAF units with US units.

Vietnamization of land clearing has been accomplished through the activation of three RVNAF land clearing companies. These units were trained through an on-the-job training program conducted by the US 62d Engineer Battalion (Land Clearing). Prior to receiving independent missions, these RVNAF units performed missions in conjunction with US land clearing companies. The major problem in the Vietnamization of land clearing has been a lack of repair parts caused by the unresponsiveness of the RVNAF supply system.

The first tangible evidence of industrial site training was the turn over of the Nui Le complex to RVNAF in June 1971. Other industrial sites have been identified for turn over in the fall of this year.

Vietnamization of LOC maintenance has been accomplished by turning over completed sections of highway to the Director General of Highways (DGOH). The MACV Director of Construction is responsible for advising the DGOH on highway maintenance and has encouraged the development of highway maintenance teams.

F. Personnel

CONFIDENTIAL

A topic of interest in the personnel area, not mentioned in Part 1 but deserving attention, has to do with MOS skills and availability of trained personnel. Unit commanders never seem to feel that incoming personnel are adequately trained, and certainly all would agree that a few weeks at Fort Leonard Wood do not produce, to a high degree, the proficiency required for operation of the relatively complex items of construction equipment such as graders, cranes, paving machines and scrapers. Many operators do become quite proficient after a few months of intense construction operations, but most of these either leave the service or are promoted to NCO status. In either event, the operator is lost and a new one must be trained. At present, the highest grade for an equipment operator is Specialist Five. The authorization of an appropriate number of E-6 positions, especially for operation of the more complex construction equipment, may offer the Army considerable savings in the long run.

Another personnel area, of vital importance to development of a professional Army, is the discharge of unfit or unsuitable soldiers (AR 635-212). There is great reluctance, among company commanders and first sergeants, to wade through the cumbersome and complex paper work -- admittedly necessary, to protect the Army and the individual -- required for a 212 discharge. Junior officers and NCO's apparently prefer to put up with the habitual shirker or drug addict, rather than struggle through the involved discharge procedures. To offset this self-defeating "foot dragging" has required sustained command emphasis, and every possible measure to simplify the procedures and minimize the administrative burden on the company. The administrative process has been reduced to form letters which have helped immensely, and facilitated the whole process. One of the big problems remaining is getting the typing done, which seems to be a small thing to all but the company commander, the first sergeant, and the company clerk. Typists are hard to find among young soldiers today.

G. Redeployment

Combat Battalions have been redeployed, when the associated tactical units they supported were redeployed. LOC construction battalions are scheduled for redeployment generally as they complete their LOC work.

The following is a list of non-divisional engineer units that have been redeployed, inactivated or drawn down over the period of this report.

CONFIDENTIAL

CONFIDENTIAL

a. Redeployed or Inactivated.

<u>UNIT</u>	<u>STR</u>	<u>DATE</u>
35th Engr Bn (Cbt)	812	15 Sep 70
79th Engr Gp	111	14 Dec 70
19th Engr Bn (Cbt)	812	14 Dec 70
588th Engr Bn (Cbt)	812	15 Nov 70
41st Engr Co (PC)	225	14 Dec 70
362d Engr Co (LE)	186	15 Nov 70
517th Engr Co (LE)	186	15 Dec 70
595th Engr Co (LE)	186	15 Dec 70
687th Engr Co (LC)	132	15 Nov 70
500th Engr Co (PB)	126	30 Apr 71
572d Engr Co (LE)	186	22 Mar 71
547th Engr Co (MD)	29	26 Feb 71

b Units drawn down to less than 5%.

<u>UNIT</u>	<u>STR</u>	<u>DATE</u>
HHC 937th Engr Gp	95	15 Apr 71
46th Engr Bn (Const)	364	15 Apr 71
589th Engr Bn (Const)	350	15 Apr 71
HHC 18th Engr Bde	166	15 Apr 71
HHC 20th Engr Bde	166	15 Apr 71
93d Engr Bn (Const)	935	31 Jul 71

c. Other units drawn down.

<u>UNIT</u>	<u>No. of Spaces Drawn Down</u>	<u>DATE</u>
100th Engr Co (FB)	198	15 Apr 71
553d Engr Co (FB)	67	15 Apr 71
94th Engr Det (Qry)	115	15 Apr 71
227th Engr Det (TOPO LN)	8	15 Apr 71
31st Engr Bn	153	15 Apr 71
62d Engr Bn (Const)	50	15 Apr 71
ENGCOM Dist	76	30 Apr 71

CONFIDENTIAL

CONFIDENTIAL

d. Units inactivated to support force structure changes.

<u>UNIT</u>	<u>STR</u>	<u>DATE</u>
17th Engr Det (Fire Truck)	12	14 Dec 70
52d Engr Det (Fire Truck)	6	14 Dec 70
527th Engr Det (Fire Truck)	6	14 Dec 70
537th Engr Det (Fire Truck)	6	14 Dec 70
111th Engr Co (Water Supply)	95	5 Oct 70
96th Engr Det (Fire Truck)	6	26 Nov 70
59th Engr Det (Fire Truck)	6	26 Nov 70
329th Engr Det (Utility)	28	26 Nov 70
570th Engr Det (Utility)	28	26 Nov 70

The redeployment of tactical units did not result in a corresponding reduction in Engineer operational support requirements. Instead, Engineer Command was frequently faced with urgent increased requirements. This was due primarily to the relocation of remaining units to more centralized locations. This was especially true in the case of aviation units requiring construction of aircraft revetments. Wherever possible, precast concrete revetments were utilized. This not only reduced the troop effort required, but also allowed for relocation of the revetments with future unit relocations. As the command shrinks and consolidates by redeployment within country, we are **emphasizing** relocatable, prefabricated construction so as to get **ready** for further moves, and reduced Engineer support. This is true **for** revetments, towers, bunkers, latrines, etc.

H. Outlook

The major effort now is to bring US work to an orderly conclusion and to leave RVNAF in a good position to continue the job. There is no doubt that RVNAF engineers can acquit themselves well; however, emphasis must be applied -- over the coming months -- to improving maintenance and repair parts supply within RVNAF.

CONFIDENTIAL

PART III

DEBRIEFING REPORT (PCS-CSFOR-74)

Engineer, US Army, Vietnam
Commanding General, US Army Engineer Command, Vietnam
25 June 1970 - 6 August 1971

Follow-on Evaluation Of
Commercial Construction Equipment
LOC Program, Vietnam
July 1971

CONTENTS

BACKGROUND	1
FACTORS EFFECTING OPERATION	
Test Standards	2
Maintenance TDA	2
Use of MCA/LCC Equipment	2
Maintenance	2
Factory Reps	2
Operators	2
Abuses	2
EVALUATION	3
Summary of Evaluations	4-7
Overall Evaluation	8
Operator Training	8
Repair Parts	8-10
Contract Maintenance	11-12
Manuals	12
Down Time	12-14
SUMMARY	15-16
RECOMMENDATIONS	17
REFERENCES	16
TABS	
A 6CY Scoop Loader	
B WABCO 600 CFM Air Compressor	
C E.E. Etnyre 2500 GAL Asphalt Distributor	

TABLE (continued)

- D Klein 5000 GAL Water Distributor
- E Chicago Pneumatic Rock Drill
- F Concrete Patch Plant
- G Cedar Rapids Soil Stabilization Plant
- H Hyster Towed Vibratory Compactor
- I Raygo Rascal roller
- J SF Stabilization Plant
- K Utility Tractor
- L Hyster Segmented Compactor
- M Hyster SF 8-13 ton roller
- N Grader Sloper
- O 12 CY Dump Truck
- P 800 GAL Asphalt Distributor
- Q Cone Crusher
- R 250 T/H Rock Crusher
- S Gradall
- T Transit Mixer
- U Asphalt Paver
- V Jersey Spreader
- W Racine hand Compactor
- X D9G Tractor
- Y 400/600 AMP Welder
- Z Stoddie Welding attachment
- AA Rotary Broom
- BB Drill Sharpener

Follow-on Evaluation of
Commercial Construction Equipment
LOC Program, Vietnam
BACKGROUND

In April 1970, the USAFV Engineer presented an evaluation (1) of commercial construction equipment to the Chief of Research and Development, Department of the Army (2). The evaluation was a field appraisal of the applicability of commercial construction equipment to military engineering. At the time of the evaluation, the CG, USAECV, recommended that the evaluation period be extended to September 1970 to provide a full construction season upon which to base an analysis. CCARD concurred with the recommendation (3).

The March 1970 evaluation discussed reasons for procurement, the weather, the terrain, and concluded that the MCA procured LOC (MCA/LOC) equipment increased highway laydown by 50%, can be operated by troops and Vietnamese civilians, and is effective.

This is the follow-on evaluation of the (MCA/LOC) commercial construction Equipment. The evaluation is based on analytical comments provided by the 18th and 20th Engineer Brigades, Engineer Groups and Battalions using the equipment, and the staff of the US Army Engineer Command Vietnam. It covers the period April 1970 thru December 1970 - a period encompassing a construction season and part of a wet season. This evaluation addresses only items of equipment and does not attempt to evaluate the concept of procuring construction equipment funded against a project.

(1) References are on page 11.

FACTORS EFFECTING EVALUATION

As in the March 1970 evaluation, recognition must be made of several factors effecting this follow-on evaluation.

- No test standards were established. This evaluation is based on subjective comments from the field based on equipment performance and staff comments based on administrative/logistics aspects experienced at all levels.
- The TDA for contract maintenance was not approved until March 1971. Thus, special tools and other essential equipment were not necessarily on hand during the period of evaluation. In addition, it was not until late 1970 that major assemblies were rebuilt on a routine basis.
- MCA equipment is usually used by units in preference to TOE equipment because (1) there is less unit maintenance effort required, (2) repair parts are more readily available and (3) the substantially increased production rates.
- There is a high turnover of contract maintenance personnel.
- Factory representatives, with the exception of Caterpillar Tractor Company, have not visited RVN.
- Qualified operators must be trained and soon rotate. The young, inexperienced engineer soldier remains as the predominant operator.
- Equipment abuses, stemming from inexperienced operators and managers, continue to effect the operation of all types of equipment.
- The equipment is getting old in terms of hours of operation.
- The equipment is generally dedicated to road construction.

EVALUATION

In evaluating the MCA/LOC equipment several essential elements were considered. These were all aimed at addressing the basic question, "Is off-the-shelf commercial construction equipment suitable for military engineering?" There is little doubt that the industry has made great strides in the past few years. The idea has been to get more productivity in the face of rising costs. If these items are suitable for military engineering, they can increase productivity in the face of decreasing troop levels.

The following questions were addressed:

1. How was the equipment used?
2. How does the item compare to TOE items?
3. How does use of equipment effect productivity?
4. Does use of equipment result in a savings in manpower or other machines?
5. Does the equipment do some job that TOE equipment can not do?
6. What are the limiting factors (weight, durability, maintenance)?
7. What was the impact of training operators and mechanics (soldier proof)?
8. What are advantages/disadvantages over TOE equipment?
9. What special equipment was required in connection with item?
10. What effect does weather have on item?

TAB C A-BB discuss each item of equipment except the concrete bucket, curb extruder, hot oil heater and 9 $\frac{1}{2}$ CY scoop loader all of which are low density or infrequently used items. Each tab discusses:

Equipment effectiveness; how item was used; how it compares with TOE item; productivity; savings; limiting factors.

56

Impact on Training: Specialized training beyond AIT and orientation CJT.

(Note: the comment "None" suggests only that no special formal training is anticipated; in all cases orientation CJT is required).

Add-on Equipment: Items of equipment that are required to support or service item in question.

Performance: over all subjective evaluation considering all factors.

Implementation into TOE: suggested DOI.

Modifications: suggestions for modification that will improve suitability of equipment for military operations.

Acceptance criteria: suggested criteria for future acceptance of specific item.

SUMMARY OF EVALUATIONS

6CY Scoop Loader: An excellent item of equipment that triples production rate of TOE 2 $\frac{1}{2}$ CY loader, operates in rugged terrain without impact on training and maintenance. (Tab A)

WABCO 600 CFM AIR COMPRESSOR: A good item of equipment but inferior to TOE Ingersoll-Rand. Has two limiting factors: weak tongue assembly and unprotected electrical system. (Tab B)

2500 Gallon Bituminous Distributor: A good item of equipment that doubles TOE production rates without adverse impact on training. Item is under-powered and cannot operate in rugged terrain. (Tab C)

5000 Gallon Water Distributor: The Klein 5000 gallon distributor is an excellent item of equipment that more than triples TOE production rates

without adverse impact on training and maintenance. It can not operate in rough terrain because it is too heavy. (Tab D)

Chicago Pneumatic Rock Drill: An excellent item of equipment that has no adverse impact on training or maintenance but that offers no advantage over TOE rock drill. (Tab E)

Concrete Batch Plant: An excellent item that produces high quality concrete at a rate far exceeding TOE lot Mixer with no adverse impact on training or maintenance. However it is not mobile as is the lot mixer. (Tab F)

Soil Stabilization Plant: An excellent item that significantly increases stabilized base course production with no maintenance related limitations. If adopted, operator training will be required. (Tab G)

Hyater towed Vibratory Compactor: A good item that will augment compaction capability but that has frequent mechanical faults. (Tab H)

Raygo Hascal Vibratory Roller. An excellent item that has no TOE counterpart. It doubles production rates for base course production with no adverse impact on training or maintenance. This item was universally accepted by all using units and strongly recommended for incorporation into TOE. (Tab I)

Self Propelled Stabilization Plant: An excellent item of equipment that is superior to TOE Rototiller and doubles production rates with no adverse impact on training or maintenance. (Tab J)

Utility Multinoe Tractor. An excellent item of equipment that is especially well suited to base construction and wet weather jobs. It is more effective than entrenching machine and has only limited impact on training. (Tab K)

58

Hyster Segmented Compactor: An outstanding item that increases production 4-5 times with no adverse impact on training and maintenance. This is the most universally liked item of MCA/LCC equipment because of its tremendous impact on production. The most liked feature is that it operates in both directions. (TAB L)

Hyster Self Propelled 5-12 ton Roller: An excellent item of equipment that is superior to TOE 10 ton roller and has no adverse impact on training or maintenance. (TAB M)

Grader Sloper: An unsatisfactory item of equipment that is too heavy for use. (TAB N)

12 CY Dump Truck: An excellent item of equipment which increases production 3 times but must be confined to operation on good roads. There is no adverse impact on training or maintenance. The larger 20 CY belly-dumps used by MCA and the Seabees in RVN would have been even better in most locations.

800 Gal Asphalt Distributor: A fair item of equipment that is not as effective as TOE distributor. (TAB P)

Cone Crusher: An excellent item of equipment which saves 50% in manpower with no adverse impact on training or maintenance. (TAB Q)

250 Tpd Crusher: An excellent item of equipment which saves 50% in manpower, improves efficiency, and has no adverse impact on training or maintenance. (TAB R)

Gradall: An outstanding item that increases capability and flexibility of earthmoving units many fold with no maintenance problems. Extensive operator training is necessary for maximum performance. This item was acclaimed as the most versatile item of MCA/LCC equipment, especially in wet weather. (TAB S)

Transit Mixer: A good item of equipment which should be provided with concrete batch plants. (TAB T)

Cedar Rapids Asphalt Paver: An excellent item that is superior to TCE paver and offers no adverse impact on training or maintenance. (TAB U)

Jersey Screeder: An excellent item that effectively places stabilized base course with no impact on training and maintenance. (TAB V)

Macine Hand Tamper: An unsatisfactory item of equipment because it is too light and falls apart. This item has caused the most controversy. Some Delta units find it quite effective in pot hole work; others think it totally unsatisfactory - primarily due to maintenance. (TAB W)

Caterpillar D7 Tractor: An outstanding item employed in quarry operations which has no adverse impact on training and has an excellent maintenance profile. This item is considered invaluable and is universally accepted as superior to the D7 in quarry work. (TAB X)

COO AFE Welder: A good item of equipment that effectively performs its job with no adverse impact on training or maintenance. (TAB Y)

Stoodie Welding Attachment: An excellent item essential for efficient maintenance of rock crusher rolls and cones offering no maintenance problems and minimal impact on training. (TAB Z)

Rotary Broom: A good item that offers no advantage over TCE item. (TAB AA)

Drill Sharpener: A good item which will result in dollar savings with no adverse impact on training or maintenance. (TAB BB)

OVERALL EVALUATION

60

The commercial construction equipment procured to support the LOC program has greatly increased the construction capability and versatility of the Army Engineer. This equipment is suitable for military construction encountered throughout the Republic of Vietnam. The few cases of excessive equipment failure or unsuitability stem from lack of special tools, special equipment, limited need, or poor management. In summary, commercial construction equipment can be used effectively in military construction operations.

OPERATOR TRAINING

The careful selection of operators is the key to success. The actual orientation training relies heavily on contracted technical representatives from Quinton-Budlong. Continuous operation or "OJT" usually produces satisfactory operators. An authorized career status for commercial equipment operators would alleviate the constant retraining process and reduce personnel turbulence. These career specialists would receive special instruction, after AIT, similar to training provided in RVN by Quinton-Budlong.

REPAIR PARTS

MCA/LOC equipment, like engineer TOE equipment, is low density compared to equipment in the whole system. For this basic reason, repair part supply is a problem. As with all isolated units, the delivery of parts to remote construction sites adds to the problem. The contractor initially lacked the personnel to adequately manage repair parts. With the exception of the GMC strike in late 1970, however, repair parts for commercial equipment present a lesser problem than parts for TOE equipment. They are generally more available

61

due to a separate dedicated repair parts system (Figure 1). The GMC strike did adversely effect the availability of repair parts. In some cases, e.g the International Harvester 12 CY dump trucks, the overpack of repair parts was woefully inadequate and the follow-on availability from the contractor very slow.

REPAIR PART SYSTEM MCA / LOC EQUIPMENT

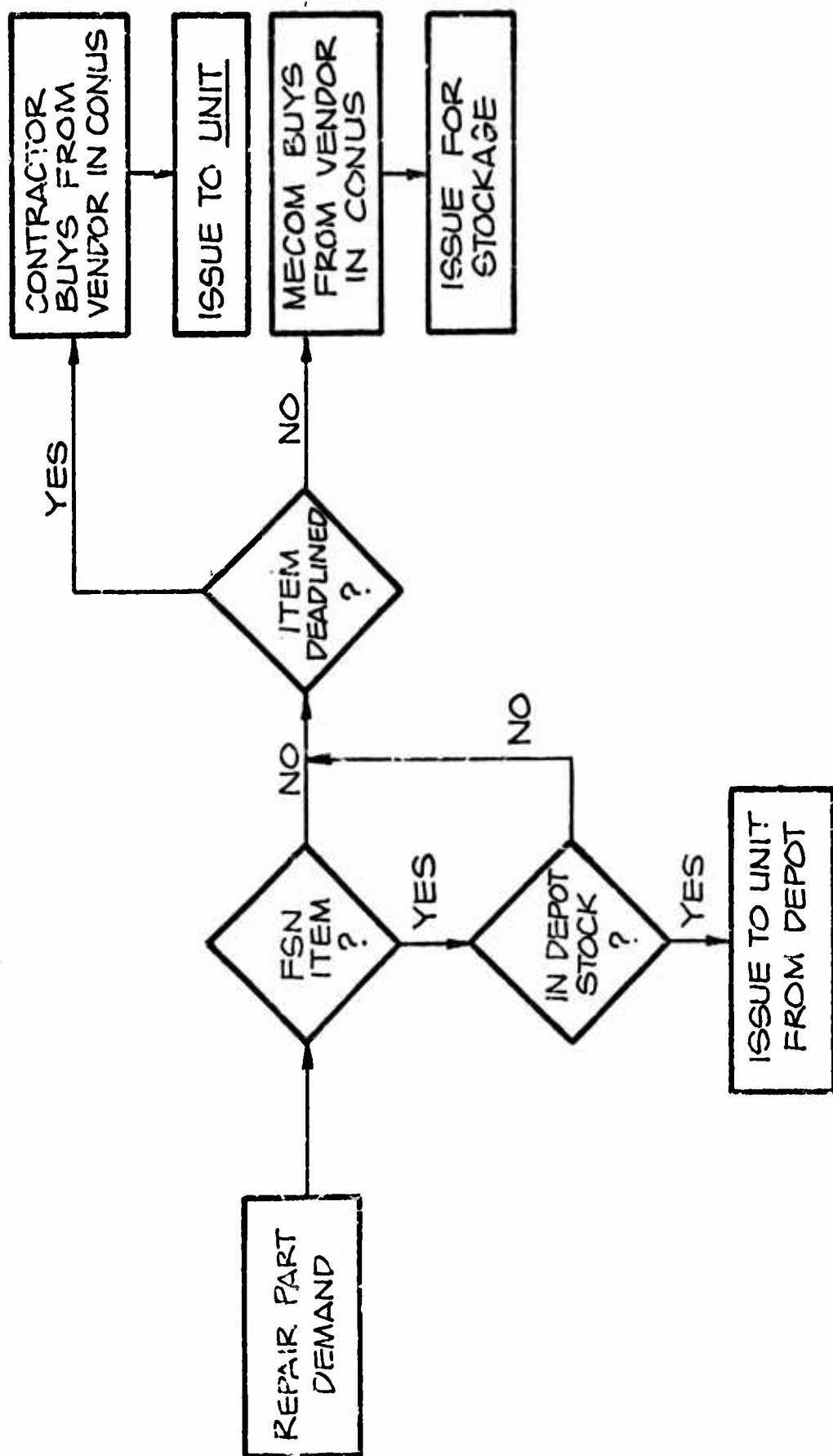


Figure 1

CONTRACT MAINTENANCE

Contract maintenance is desirable for support of commercial construction equipment. However, the system used to date involves minor internal deficiencies which are being corrected. These deficiencies include lack of qualified operators and mechanics, high turnover rates of maintenance personnel, poor repair parts management, and abuse of equipment and tools. These problems are identical with those confronting military maintenance supervisors and can be corrected by improving the terms of the contract.

In June 1971 the Dynalectron Maintenance Contract was renewed. It was improved by:

- adding seven US repair parts personnel and 8 Vietnamese.
- Adding one supply lead foreman.
- Centralizing repair parts stockage management.
- increasing number of industrial electricians from 9 to 13.
- increase of pay for certain critical skills.
- increased ceiling on the number of local hire personnel.
- increased night differential.

Future contracts should have some type of incentive. Although difficult to administer, the incentive would pay the contractor more for doing less work. That is, fewer items deadlined over a predetermined period of time would result in a cash reward to the contractor.

The approval of the TDA for contract personnel in March 1971 will permit several improvements. Prior to March battalions were confronted with providing organic equipment to the contractor. The separate authorization of special tools, diagnostic test equipment, and general mechanic tools will alleviate this burden. Quality and quantity of mechanics, utilization of

64

local national labor, and a system of repair parts management will be specified in future contract agreements to improve contract maintenance.

In addition, visits by manufacturer representatives to construction sites should receive more emphasis in order to expose specific maintenance problems.

MANUALS

Generally, civilian manuals are only fair publications. They vary greatly in quality. They are not part of the Army supply system. If lost, outdated, or destroyed replacement is difficult. If CCE is adopted standard Army TMs must be written.

DOWN TIME

MCA/LCC deadline rate continues to be lower than critical TOE on an item-for-item basis. Several factors contribute to this: Operators are hand picked and better trained, repair parts supply is more responsive, and when the critical MCA/LCC item becomes deadlined it receives immediate and intensive attention. Figure 2 shows deadline rates for all MCA/LCC items compared to critical TOE items. TABS A-Bb show deadline rates for specific items of equipment for CY 1970.

However, when all MCA/LCC equipment is compared to all TOE, MCA/LCC deadline rate is slightly higher. Two reasons contribute to this: First, the maximum utilization of MCA/LCC items compared to all TOE items. That is, 100% of the operational MCA/LCC equipment is used on a 10 hour/day basis while considerably less operational TOE equipment is utilized so extensively. Second, MCA/LCC equipment is getting old but is not being replaced. Figure 3 provides data on procurement cost of each item and an average cost of parts per month per item.

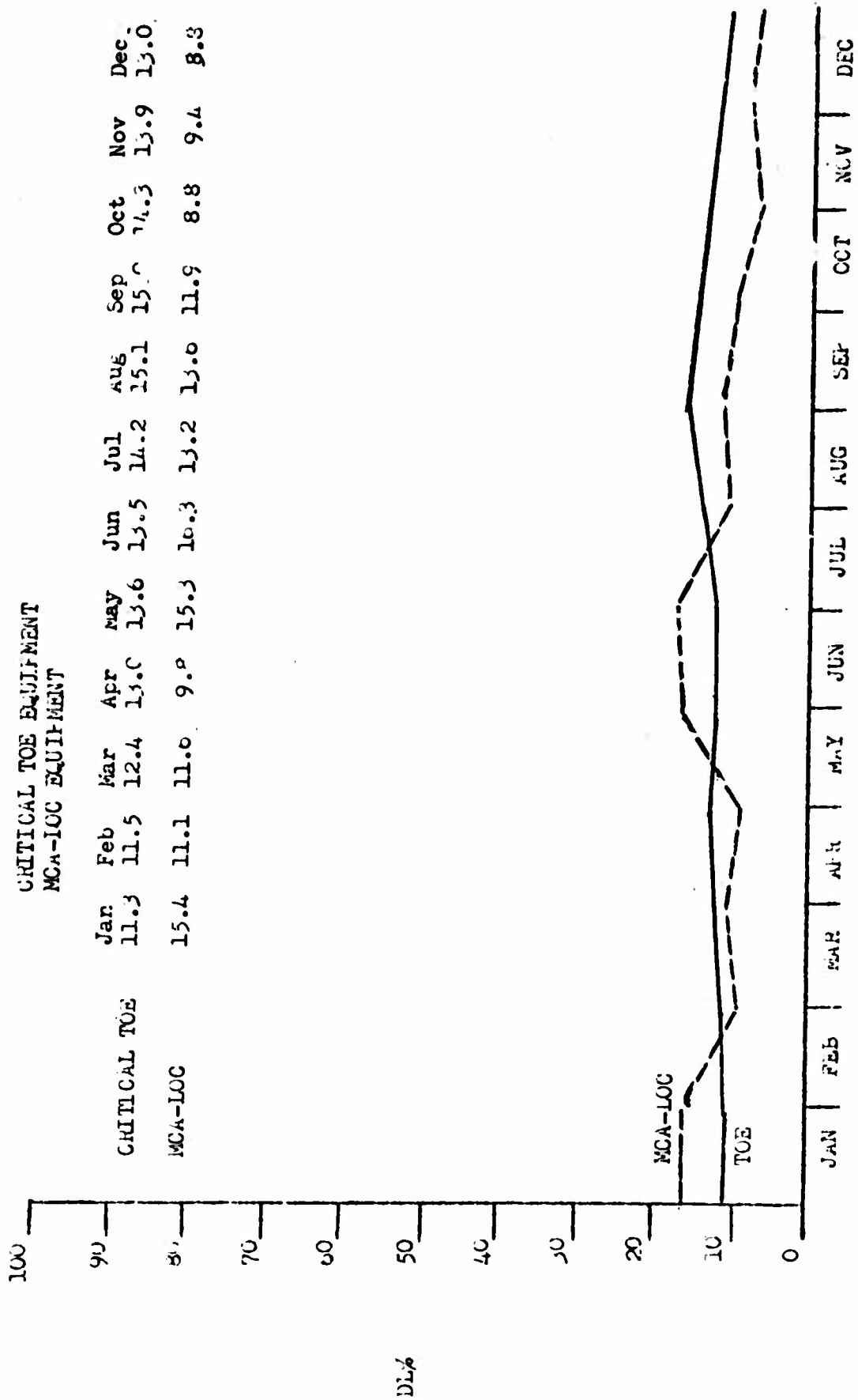


Figure 2

66

Figure 3

SUMMARY APPRAISAL

Commercial construction equipment provides Army engineers with greater versatility and significantly increased capability with relatively minor problems. Noteworthy is the fact that these problems are not new to construction operations. These problems have continually plagued both military and civilian construction engineers and include such familiar areas as unqualified operators and mechanics, turnover rates of personnel, repair parts management and equipment abuse.

One essential element to be considered in adopting CCE is the combination of civilian and military standard equipment necessary to permit construction under any circumstances. The road construction mission in Vietnam involving the LOC program for which the MCA/LOC equipment was procured is unique; however, the commercial construction equipment concept is adaptable to other military construction support situations as well. Though some combat support missions may require the smaller, more versatile military standard equipment, there are numerous situations where a combat support mission could be accomplished more quickly and efficiently if the larger commercial construction equipment were available. The adaptation of commercial equipment to provide support for a heavy construction mission has served the military construction system well because it has permitted greater flexibility with minimum administrative and logistical problems. A feasible method of future employment of CCE is the organization of a separate company consisting primarily of commercial construction equipment, operators, mechanics, and managers. The unit, organized similar to the present Light Equipment Company, could be attached to engineer battalions to provide necessary support for heavy construction missions.

68
The centralizing of equipment and expertise would simplify or negate many of the problems previously mentioned. It should be noted that several items are immediately adaptable to existing TOE units because of the unique jobs for which they are employed.

The logistical aspect of CCE presents no problems which cannot be overcome. Contract maintenance is desirable but requires improvement in specific areas.

69

RECOMMENDATIONS

1. That following CCE be incorporated in the Army inventory:
 - a. IH 6CY Loader added to construction support company (4) and TOE 5-500 rock crusher platoon.
 - b. Klein 5000 gal water distributor added to earthmoving platoon of construction battalions (5) and light equipment companies (6).
 - c. Concrete batch plant be added as a TOE 5-500 series concrete platoon.
 - d. Cedar Rapids soil stabilization plant added as a TOE 5-500 series soil stabilization platoon.
 - e. Self-propelled soils stabilization plant replace TOE plant.
 - f. Utility tractor replace TOE entrenching machine and added to vertical platoon of construction battalion.
 - g. Hyster segmented compactor added to earthmoving platoon of construction battalion and light equipment company.
 - h. Hyster 8-13 ton roller added to TOE asphalt platoons or sections.
 - i. 12 CY dump truck replace 5 ton DT in selected dump truck companies.
 - j. Cedar Rapids asphalt paver replace TOE paver.
 - k. Caterpillar D9 be incorporated into TOE of construction support companies and quarry sections.
1. 600 amp welder and Stoodie welding attachment be incorporated with TOE 225 TPH crusher.
2. That a "commercial heavy equipment" company be developed using only CCE.
3. That civilian manuals be translated into Army Technical Manuals.
4. That a CCE operator and mechanic career field be developed.

References

- (1) Booklet, USAECV(P), Evaluation of Commercial Construction Equipment LOC Program Vietnam, dated March 1970.
- (2) Letter, USARV-AVHLEN-MO, subject Evaluation of Commercial Construction Equipment - LOC Program, Vietnam, dated 19 April 70.
- (3) Letter, DA, OCRD-CRDCM, subject Evaluation of Commercial Construction Equipment - LOC Program, Vietnam, dated 14 May 70.
- (4) TOE 5-114, Engineer Company, Construction Support.
- (5) TOE 5-115, Engineer Battalion, Construction.
- (6) TOE 5-58, Engineer Company, Light Equipment.

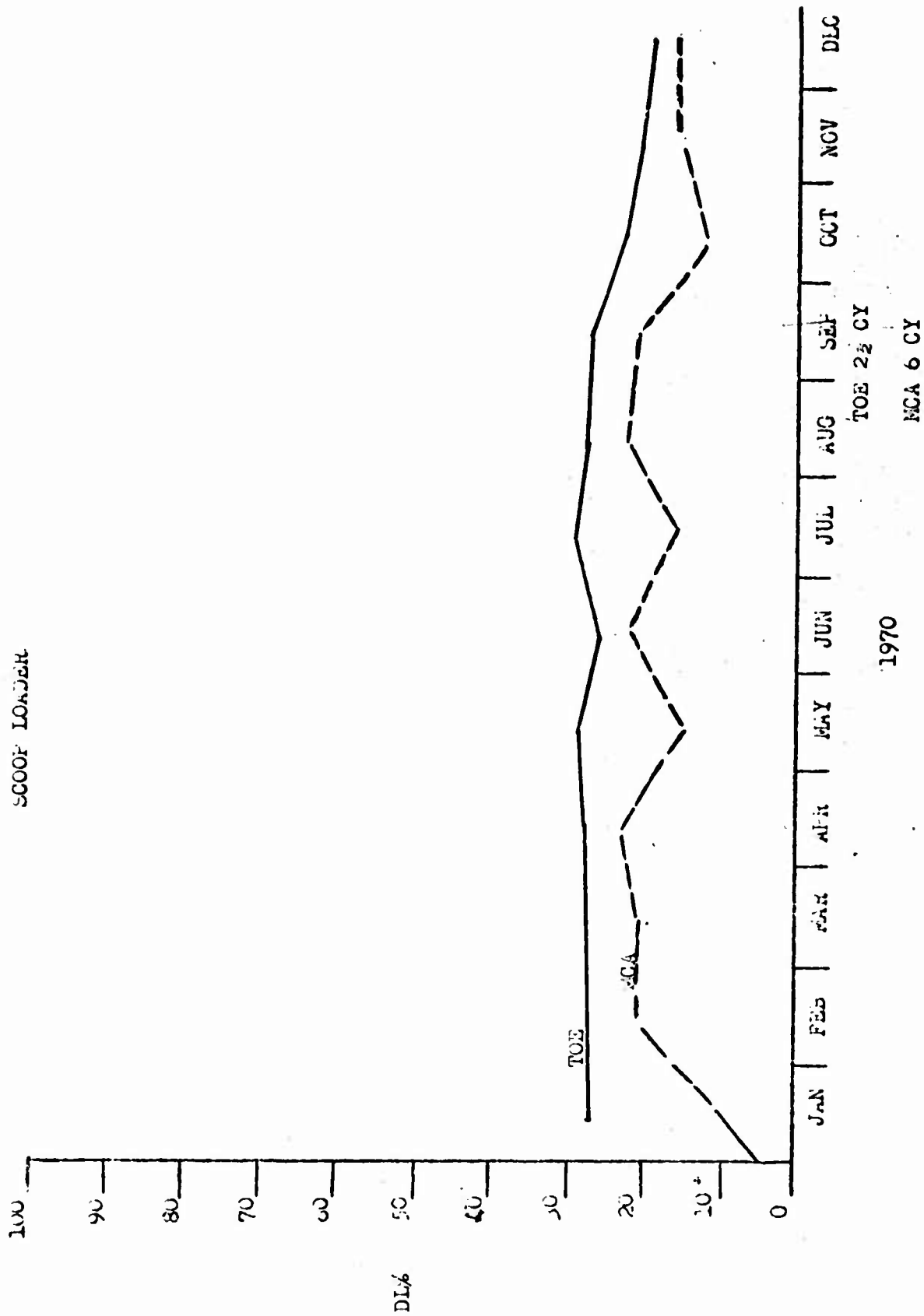
71

Loader, Scoop 6CY, International-Hough

1. Equipment Effectiveness: The 6 cy scoop loader is used in quarry operations to load blast rock and move stock piles. The MCA scoop loader performs the same functions as the 2½ cy scoop loader and a 40 ton shovel front at the quarry. It performs 3 times as much as the 2½ cy loader because of its bigger bucket and height advantage. It outmaneuvers the crane. The machine is more rugged than TOE equipment, can handle rough terrain, and has fewer maintenance problems than the TOE equipment.
2. Impact of Training: None; operators require little or no training.
3. Add-on Equipment: None.
4. Performance: Excellent.
5. Incorporation into TOE: It is recommended that 6 cy scoop loader be issued to the engineer construction support company and rock crusher platoon, TOE 5-500 series, to replace the 2½ cy machines.
6. Equipment Modification: Suggest mechanical fuel pump rather than electric; water tends to short the electric system in pump.
7. Acceptance Criteria: The present operating standards of the MCA 6 cy scoop loader are acceptable.

72

SCOOP LOADER



A-64

WABCO 600 CFM Air Compressor

1. Equipment Effectiveness: The compressor is essential to operate track drills in quarry operations. It is effective but has the following limitations: (a) steering and tongue assemblies are weak and break frequently, and (b) the electrical system is not well protected. The TOE Ingersol is rated superior to the WABCO.
2. Impact on Training: None; operates identically to TOE.
3. Add-on Equipment: None.
4. Performance: Good.
5. Incorporation into TOE: WABCO offers no tangible advantage over TOE Ingersol.
6. Equipment Modification: Protected electrical system and heavier chassis.
7. Acceptance Criteria: Must be improved as noted above.

ALR COMPRESSOR 600 CFM



1970

B-66

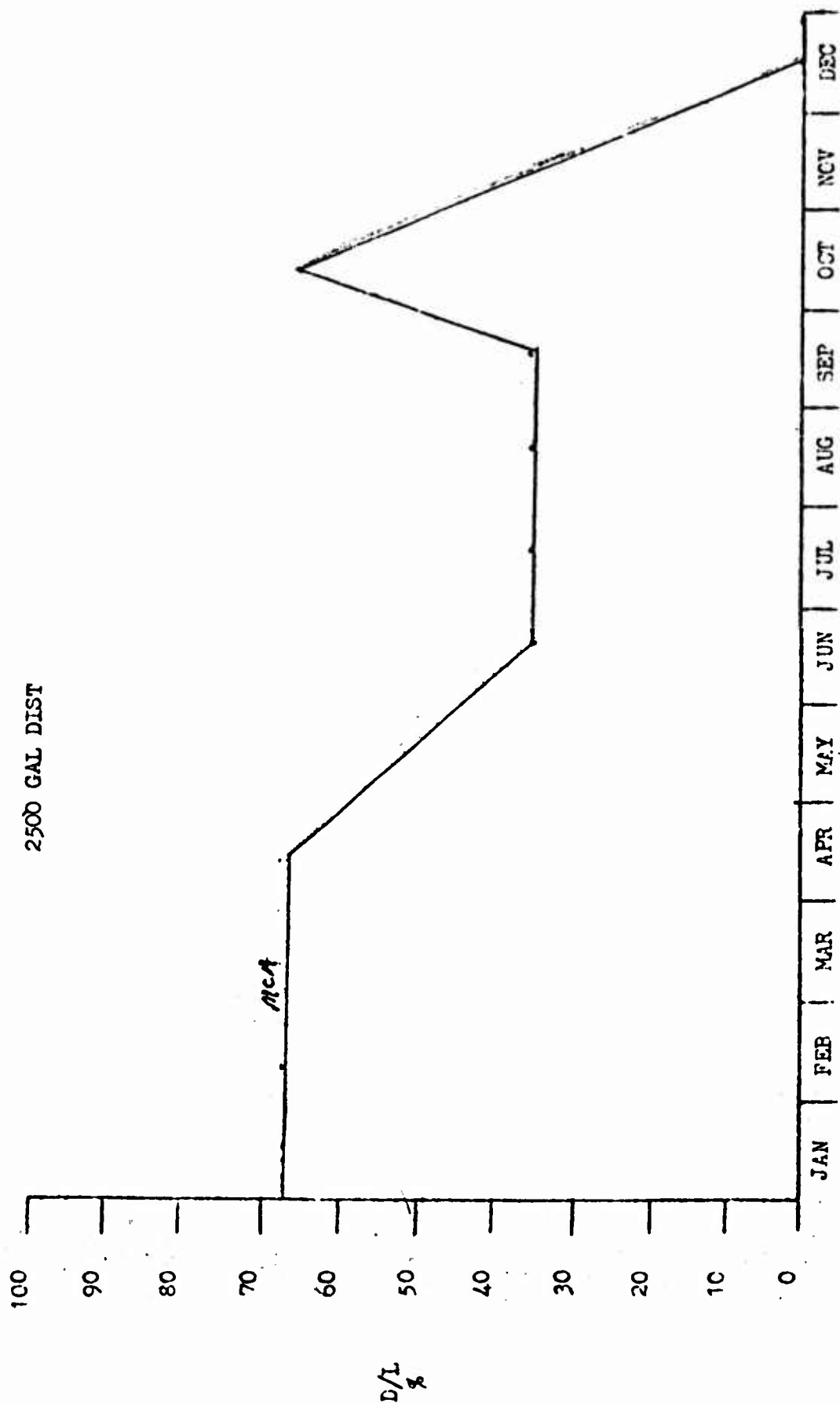
75
E.E. Etnyre, Distributor, Bituminous, 2500 Gal

1. Equipment Effectiveness: This distributor is employed for priming base rock and for applying tack coats for asphalt paving. The 2500 gal bituminous distributor performs the work of two TOE 800 gal bituminous distributors. The MCA distributor is easier to operate because it does not use a pony pump and the heat up time for the MCA distributor is shorter than the TOE distributors. With the MCA distributor, a larger area can be covered in one trip because of its larger capacity. The machine is not rugged and can not operate in adverse terrain. The spray bars are easily damaged.
2. Impact on Training: None; operation same as TOE 800 gal distributor.
3. Add-on Equipment: None.
4. Performance: Good.
5. Incorporation into TOE: Recommend that 2500 gal bituminous distributors be incorporated into the asphalt platoon and construction support company where it would replace the 800 gal bituminous distributor.
6. Equipment Modification: The prime mover is underpowered and the clutch is too small to handle a full load. These two shortcomings have caused frequent clutch problems. The clutch and the engine of the prime mover should be modified to eliminate the clutch problem. A solution to transmission and power train problems would be to mount the distributor on a 10 ton tractor chassis, whose power train, engine and transmission, are more than adequately powerful.

E.E. Etnyre, Distributor, Bituminous, 2500 Gal, continued

7. Acceptance Criteria: The machine is acceptable as is but modification would improve operation in rugged terrain.

77



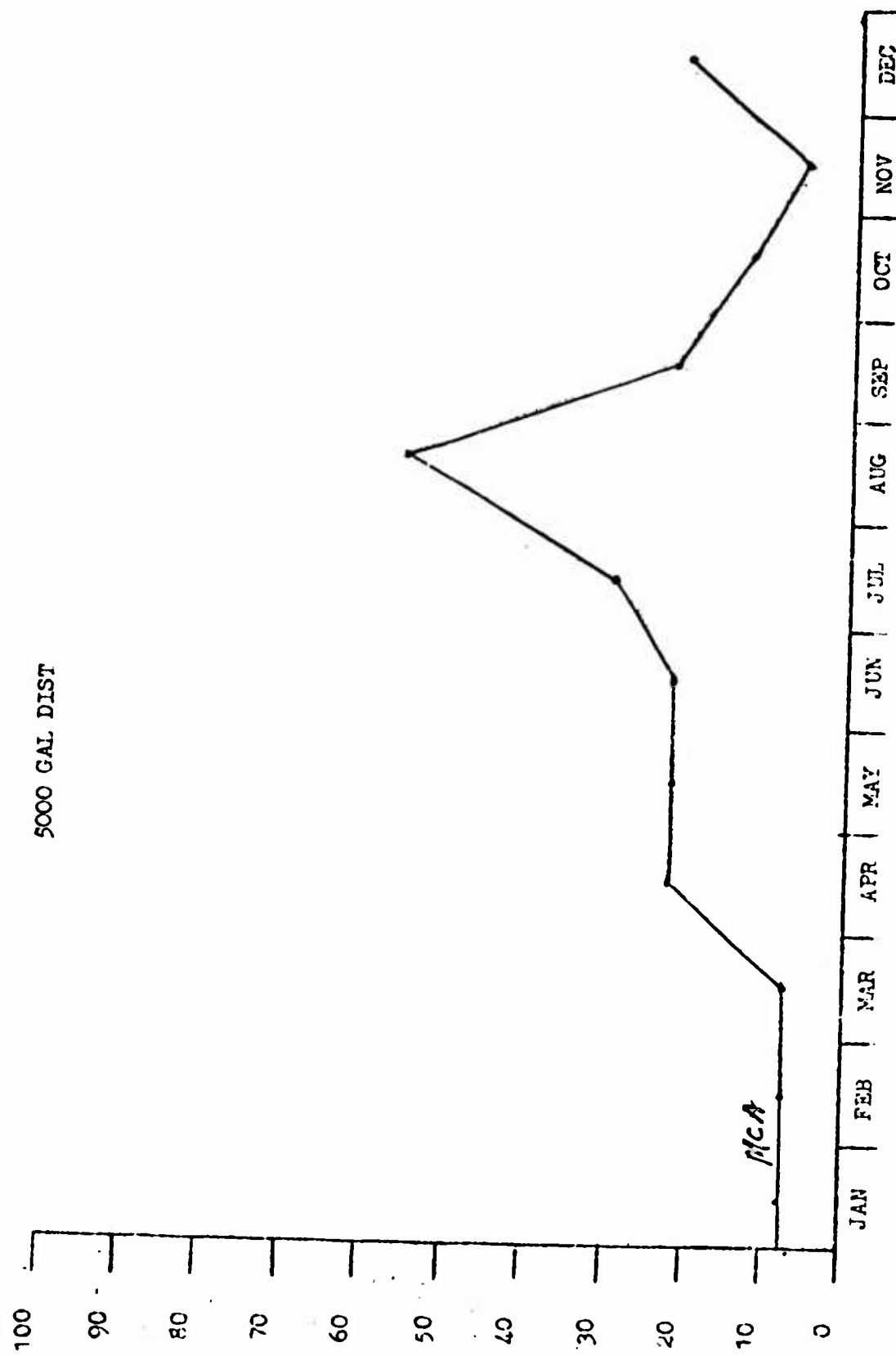
0 - 69

1970

Klein 5000 Gal Water Distributor .

1. Equipment Effectiveness: The 5000 gal water distributor is used to apply water to earth work for optimum compaction. The Klein 5000 gal distributor is superior to the 1000 gal TOE water distributor because of its larger hauling capacity. This characteristic reduces the manpower requirements and the travel time between the water point and the work area. However, the Klein is top heavy and overturns with a full load. It can not be operated in rugged terrain.
2. Impact on Training: None.
3. Add-on Equipment: Must be moved with 10 ton tractor.
4. Performance: Excellent.
5. Incorporation into TOE: Recommend that one water distributor be incorporated into the earthmoving platoon of each line company in an engineer construction battalion and light equipment company to replace the 1000 gal water distributors.
6. Equipment Modification: The body springs should be strengthened and the fender wells modified to accommodate military standard tires. Also, the present coupling mechanism should be changed to a king pin configuration to allow TOE prime movers to tow the water distributor, and the spray bar mechanism should be raised somewhat to better protect it from damage.
7. Acceptance Criteria: The present operating standards of the MCA water distributors, 5000 gal, are acceptable providing the body springs, fender wells, and coupling mechanism are modified.

79



1970

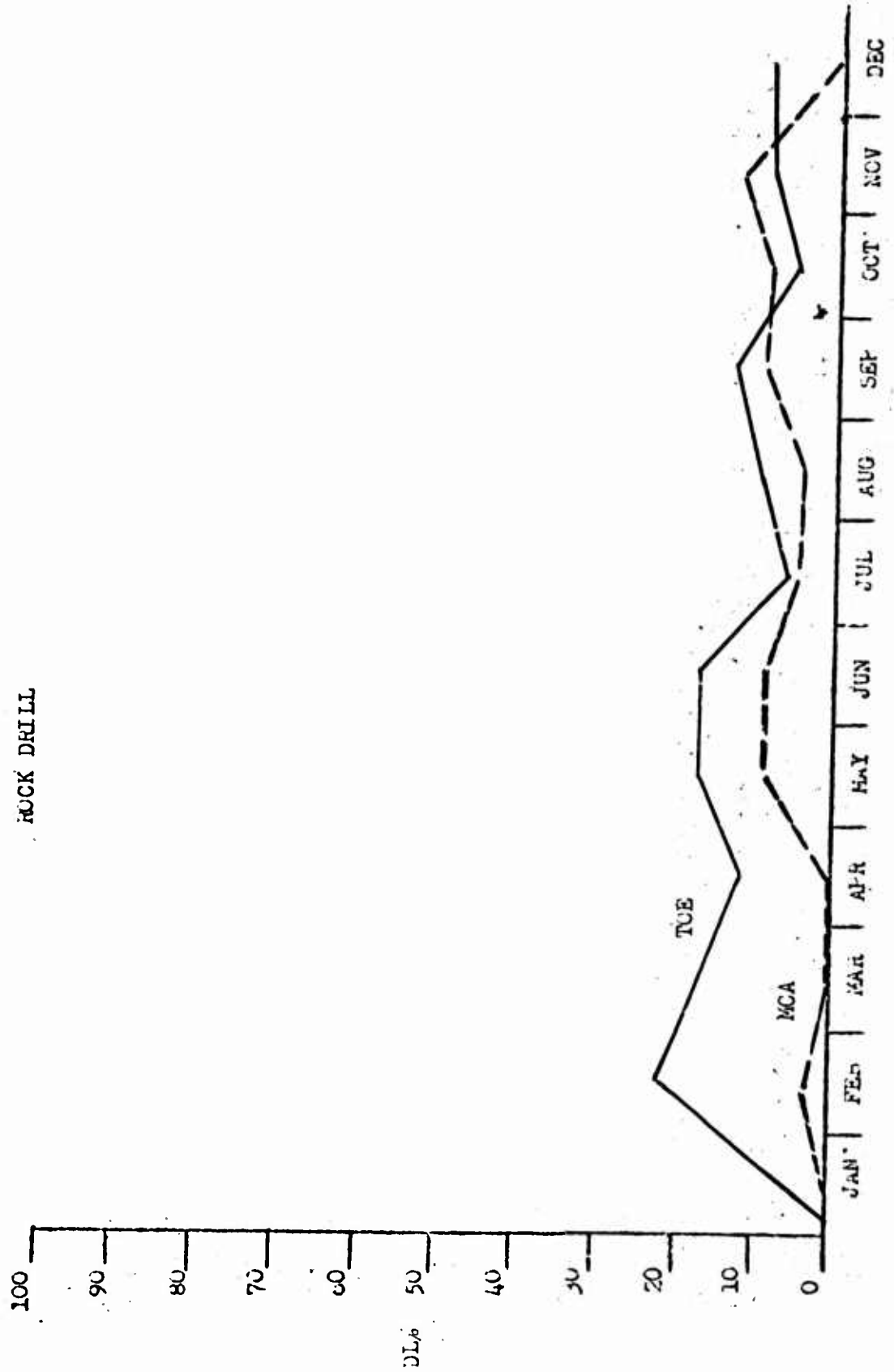
D/L
x

D-71

Chicago Pneumatic Rock Drill

1. Equipment Effectiveness: Used in quarry operations with WABCO 600 CFM air compressors. Item is just as effective as TOE item.
2. Impact on Training: None.
3. Add-on Equipment: Must be powered by 600 CFM air compressor.
4. Performance: Excellent.
5. Organizational Changes: None.
6. Equipment Modification: None.
7. Acceptance Criteria: Item acceptable as issued.

ROCK DRILL

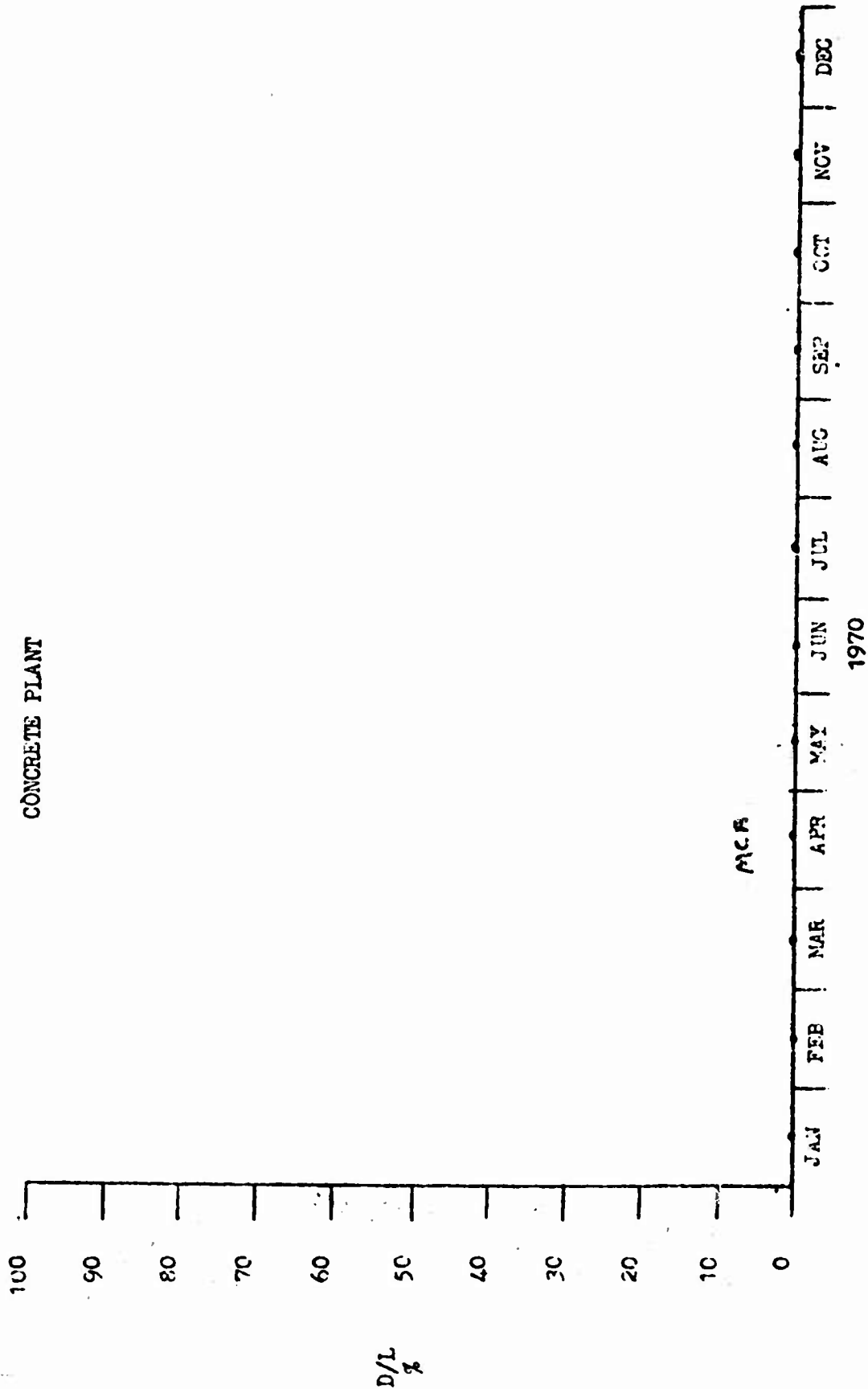


1970

Concrete Batch Plant

1. Equipment Effectiveness: Produces high quality concrete. The item of equipment against which the concrete batch plant must be evaluated is the much smaller TOE 16S Mixer. The Batch Plant has a considerably higher rate of production. It has wide spread application within the Republic of Vietnam. It performs well under RVN conditions but is relatively immobile.
2. Impact on Training: None; operators receive minimum of training.
3. Add-on Equipment: Services the transit mix truck.
4. Performance: Excellent.
5. Incorporation into TOE: Recommend incorporation in a TOE 5-500 series concrete platoon TOE along with transit mixer trucks for haul.
6. Equipment Modification: The MCA batch plant as received requires very little modification. Modification suggested is addition of vibrators on each cement hopper for easier discharge.
7. Acceptance Criteria: Present criteria are sufficient.

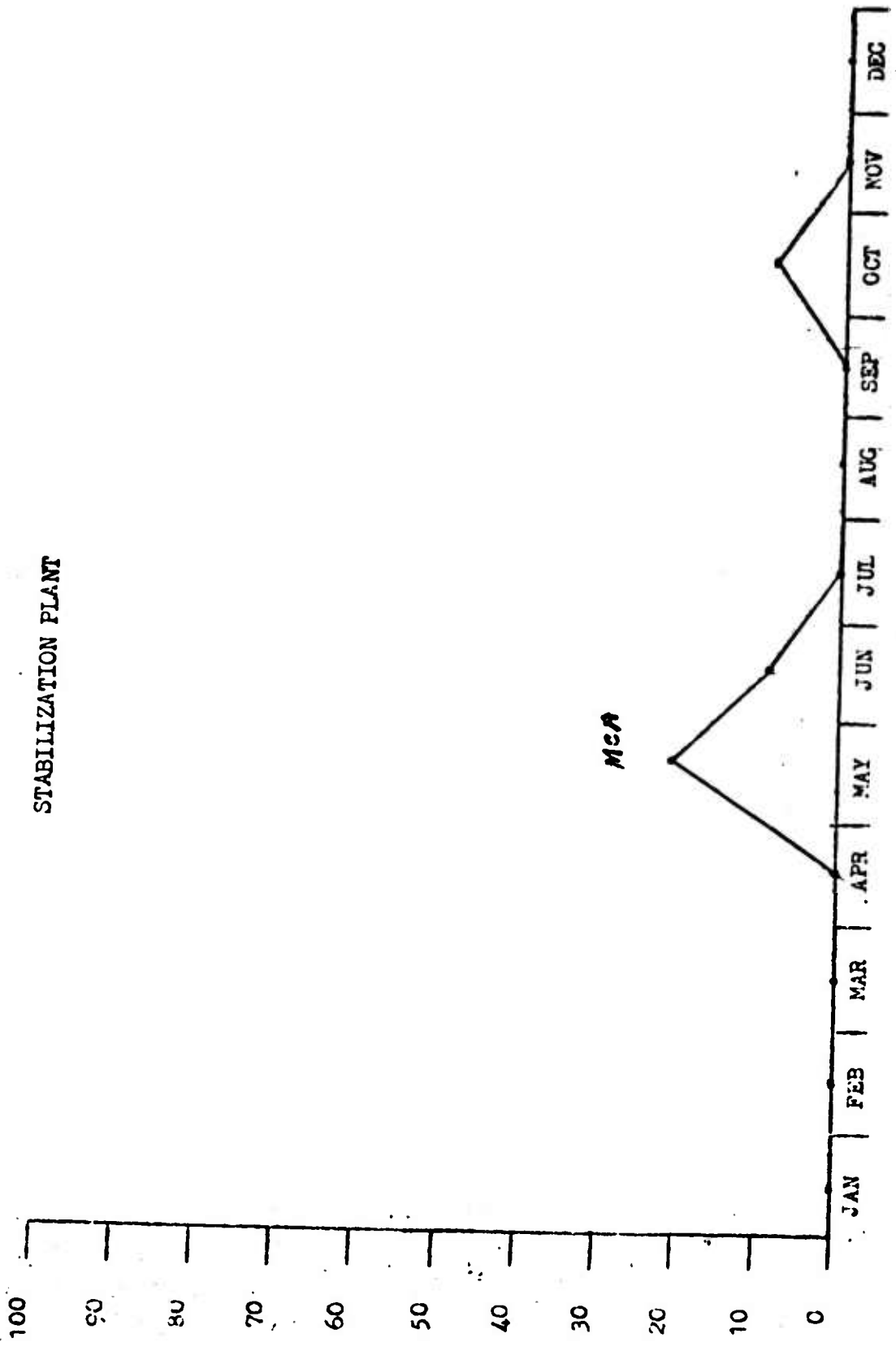
83



F-75

Cedar Rapids Soil Stabilization Plant

1. Equipment Effectiveness: The equipment is used to produce asphalt stabilized base course. This item has no TOE counterpart. Its primary advantage is that it effectively produces high quality base course material at a fast rate.
2. Impact on Training: If adopted, a program of instruction will be required to train operators.
3. Add-on Equipment: Requires dump trucks to haul output and spreaders to place product.
4. Performance: Excellent.
5. Incorporation into TOE: Issue as special item to construction support companies as TOE 5-500 series "package".
6. Equipment Modification: RC 800 metering valve constantly required adjusting and should be replaced with a better valve.
7. Acceptance Criteria: The equipment is acceptable as issued.



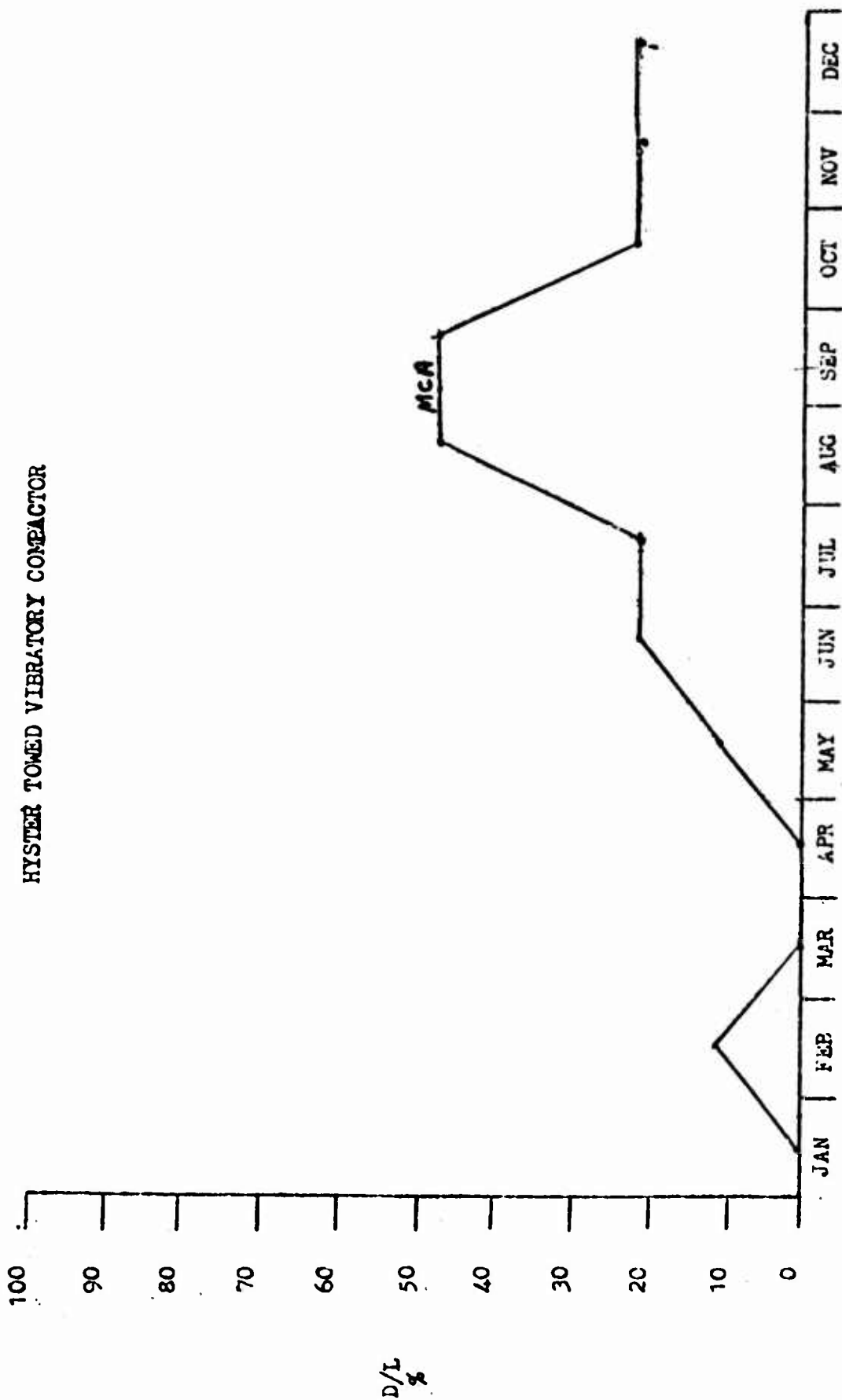
1970

86

Hyster Towed Vibratory Compactor

1. Equipment Effectiveness: Used in earth work compaction. Item is effective but has limited availability due to frequent mechanical faults.
2. Impact on Training: None.
3. Add-on Equipment: Requires prime mover.
4. Performance: Good.
5. Incorporation into TOE: Add to TOE on as-required basis.
6. Equipment Modification: Improve engine and vibratory drive mechanism.
7. Acceptance Criteria: Accept only if modifications are made.

HYSTER TOWED VIBRATORY COMPACTOR

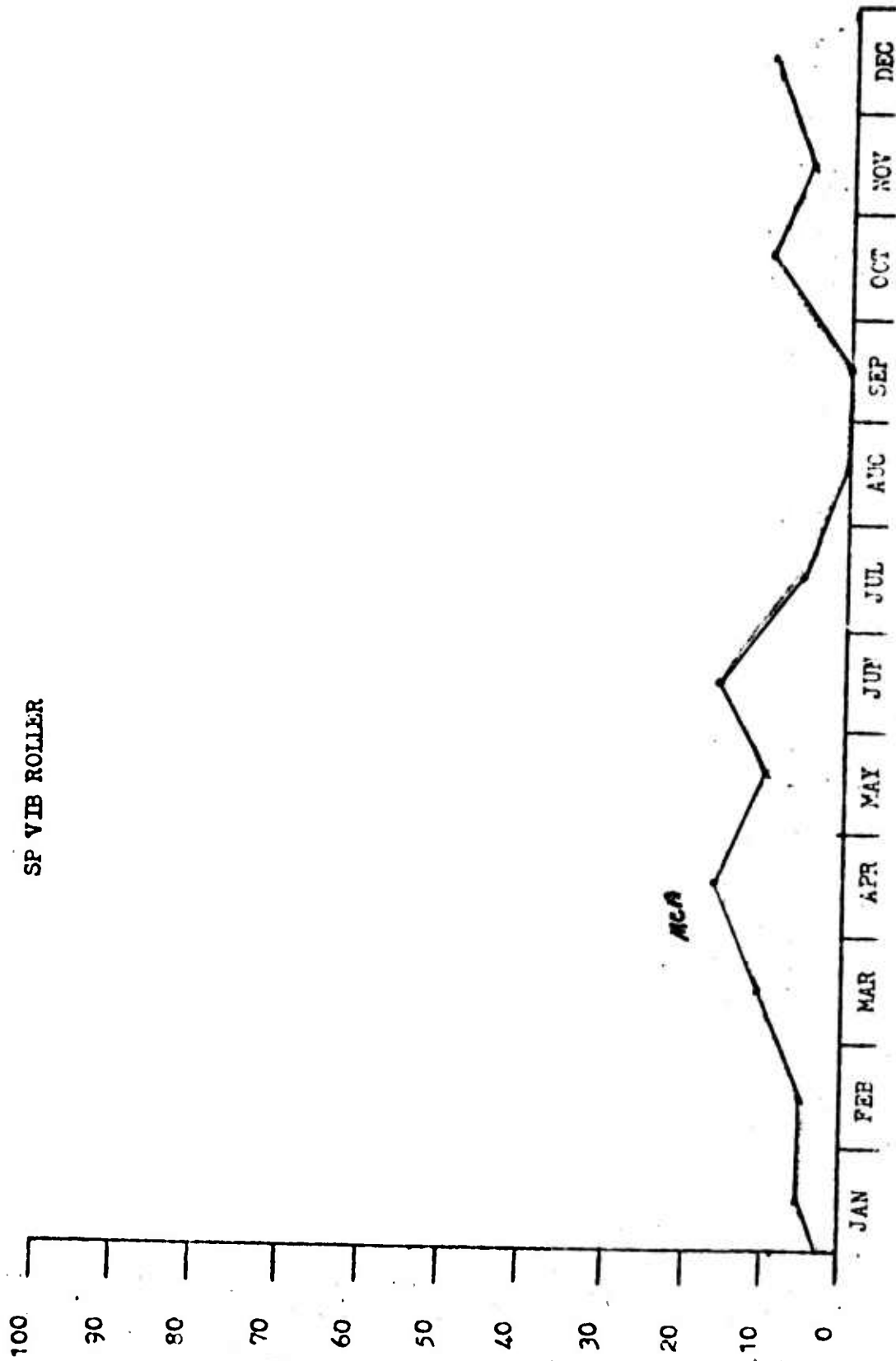


H-79

1970

Raygo Rascal 600 SP Vibratory Roller

1. Equipment Effectiveness: The Raygo vibratory roller is employed to compact base course for roads. The performance of this self-propelled piece of equipment is superior to the TOE 10 ton roller. It is approximately 50% faster than the 10 ton roller in compacting base rock. However, the Raygo should not really be compared to the 10 ton roller because the 10 ton roller is primarily used for asphalt laydown while Raygo is used for base course.
2. Impact on Training: None.
3. Add-on Equipment: Requires prime mover to transport to work site.
4. Performance: Excellent.
5. Incorporation into TOE: Add to TOE of construction battalions and light equipment companies.
6. Equipment Modification: None.
7. Acceptance Criteria: The present operating standards of the Raygo Rascal are acceptable.



D/L %

1-81

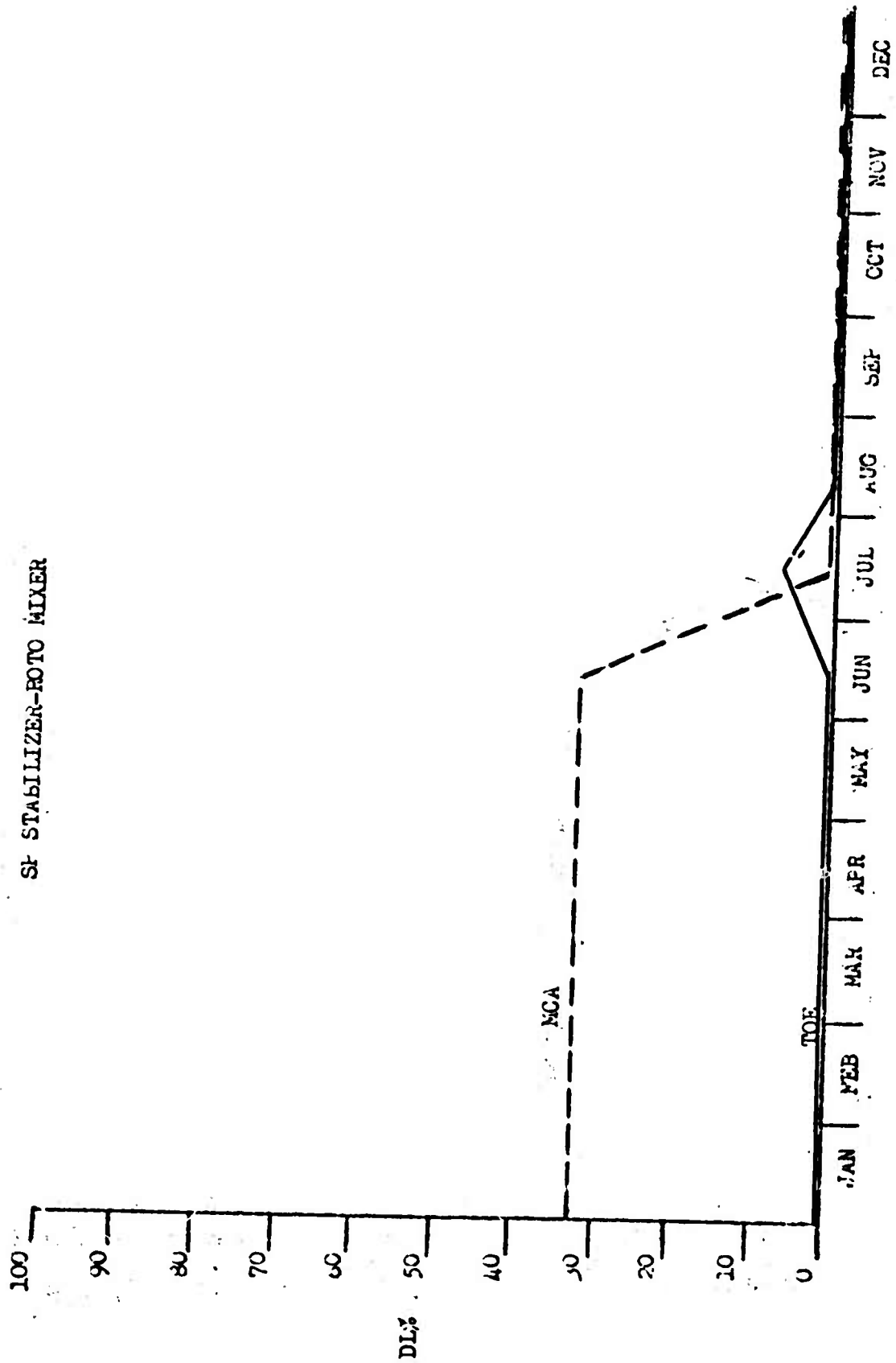
MCA

1970

SP Stabilization Plant

1. Equipment Effectiveness: The MCA equipment can be compared to the TOE Rototiller (FWD). It is larger and more powerful, making it much more effective for in place stabilization of deep lifts. The maximum lift currently possible for the TOE tiller is approximately 4" while MCA can work in 6-7" lifts. The working speed is also increased with the MCA unit, as is the width of passes, which doubles TOE production rates.
2. Impact on Training: None.
3. Add-on Equipment: None.
4. Performance: Excellent.
5. Incorporation into TOE: Recommend that this machine replace TOE stabilizers and be incorporated in a TOE 5-500 series stabilization detachment along with the stabilization plant.
6. Equipment Modification: Recommend that tires be standardized to one of the common military construction tires.
7. Acceptance Criteria: The present operating standards of this equipment are acceptable.

SP STABILIZER-ROTO MIXER



1970

J-13

Utility Tractor Multihoe

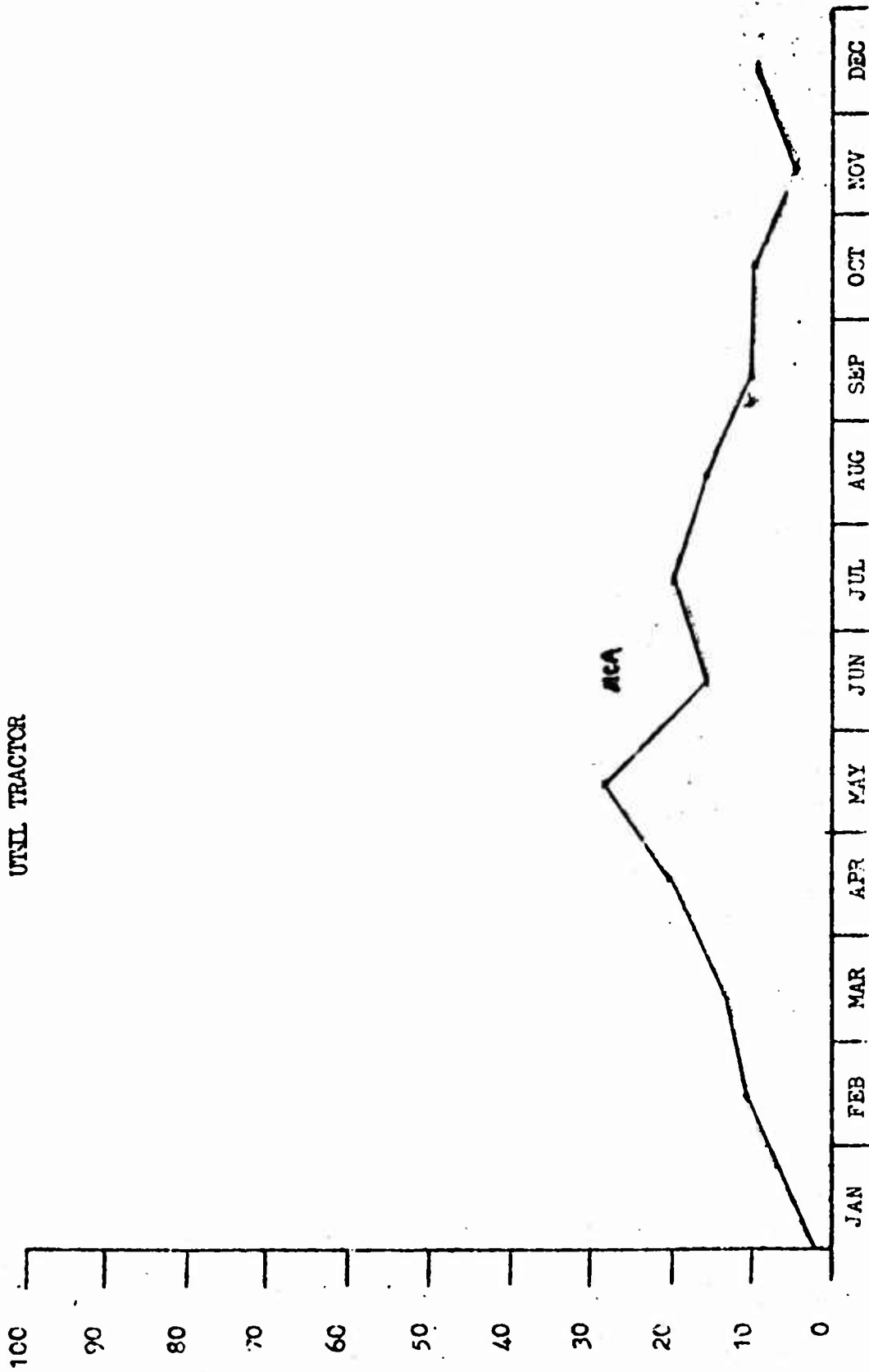
92

1. Equipment Effectiveness: The MCA utility tractor is employed to excavate headwalls, small trenches, and holes, and to a limited extent, pot hole repair. This piece of equipment performs the work of D-handle shovels and the entrenching machine for small jobs. It is superior to both. Although not as fast as the entrenching machine, it can work in smaller areas and get better results. However, use of the scoop loader bucket was unsatisfactory in Mekong Delta clays. Pettibone generally considered superior to Ford.
2. Impact on Training: Requires extensive OJT and especially well coordinated operators.
3. Add-on Equipment: None.
4. Performance: Excellent.
5. Incorporation into TOE: Replace entrenching machine on a one-for-one basis. Add one construction battalion vertical platoon.
6. Equipment Modification: None.
7. Acceptance Criteria: The present operating standards of the utility tractor are acceptable.

K-84

92

UTNL TRACTOR



D/L %

K-85

1970

Hyster C450A Segmented Compactor

1. Equipment Effectiveness: Used for earth compaction. The Segmented Compactor is superior in all phases of compaction. It is four to five times faster than the sheepsfoot roller which is the current authorized TOE equipment. The heavy weight of the segmented compactor permits it to break up large size granular material while the sheepsfoot roller is more inclined to roll over this type of material. Since the segmented compactor is self-propelled, the prime movers normally required to tow the sheepsfoot roller are released for other uses. The capability to compact the work area without turning around improves the quality of compaction and reduces the compaction time. These factors save manpower and machines. The quality of compaction is also higher than TOE items.

2. Impact on Training:

3. Add-on Equipment: Should have a 52½ ton trailer to transport to work sites.

4. Performance: Outstanding.

5. Incorporation into TOE: Recommend that one segmented compactor be incorporated into the earthmoving platoon of each line company in an engineer construction battalion and light equipment company.

6. Equipment Modification: Incorporate 24v electrical system and improve water spray pump, strengthen hydraulic reservoir and add tie downs.

7. Acceptance Criteria: The present operating standards of the MCA segmented compactor are acceptable but the recommended modifications will improve the item.

95

Hyster C530A SP 8-13 Ton Roller

1. Equipment Effectiveness: Used for breakdown and finish rolling of asphaltic concrete pavement. The item is superior to both 10 ton and 13 wheel pneumatic roller for asphalt work. It is durable and easy to maintain.
2. Impact on Training: None.
3. Add-on Equipment: Requires prime mover to transport to work sites.
4. Performance: Excellent.
5. Incorporation into TOE: Incorporate into Army system as TOE item.
6. Equipment Modification: Incorporate 24v electrical system, improve spray pump and add tie downs.
7. Acceptance Criteria: Present equipment is acceptable but recommended modificatic. will improve item.

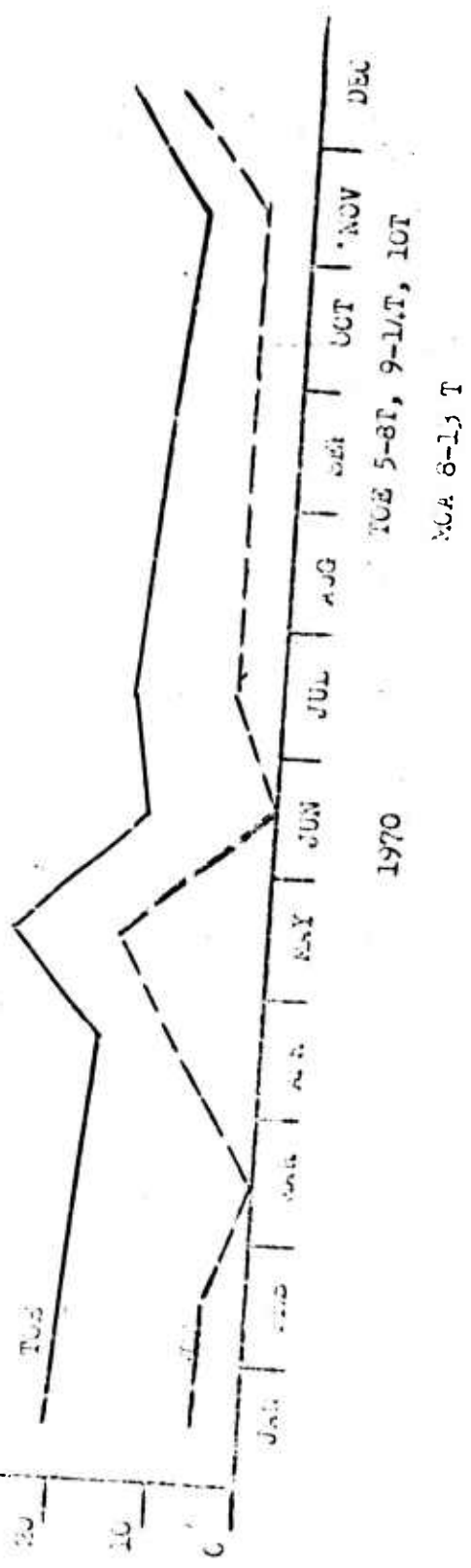
M-87

100
90
80
70
60
50
40
30
20
10
0

Days

M-88

8-23 TON ROLLER



1970

TOE 5-8F, 9-L.T, 10T

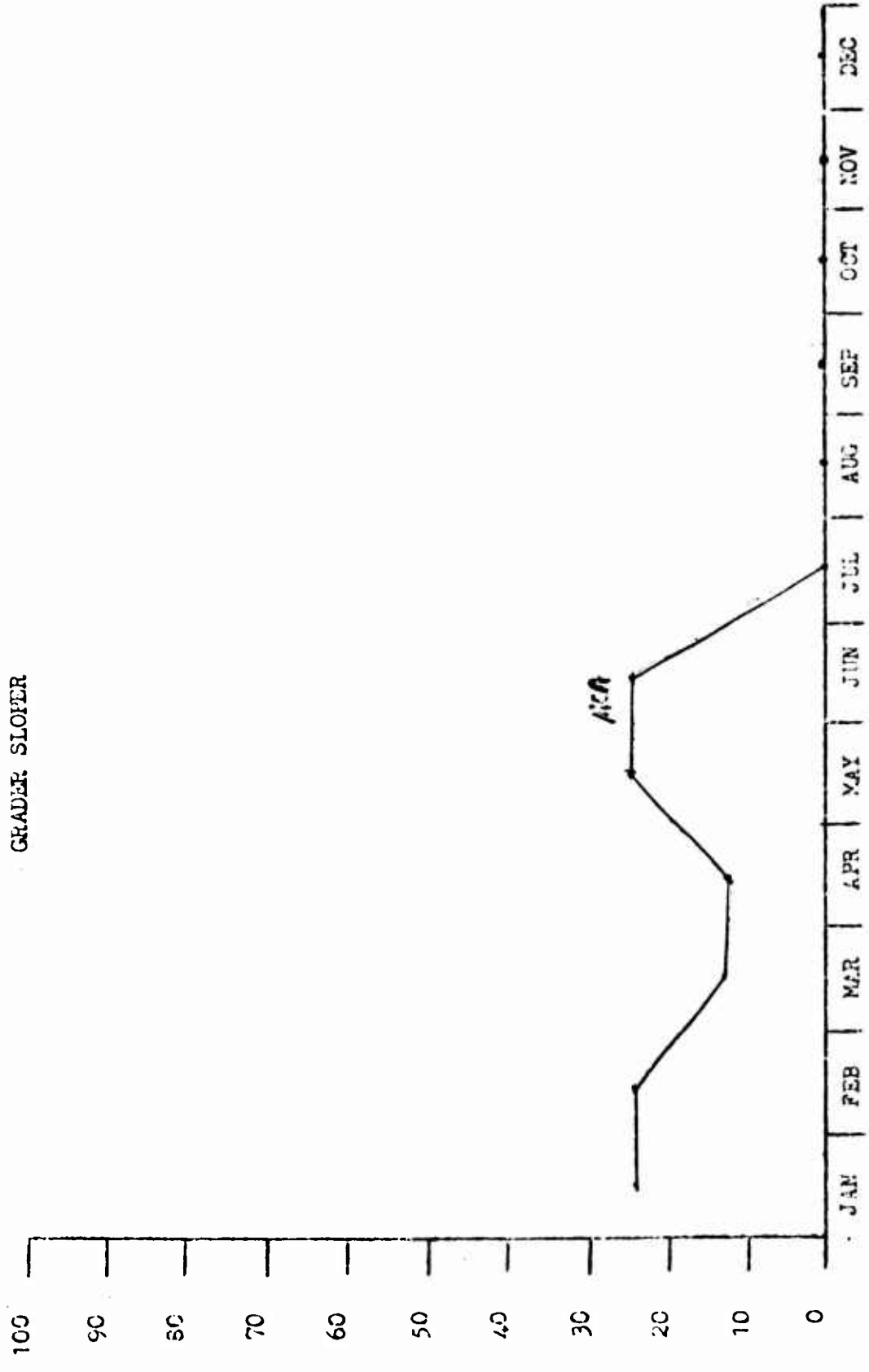
MOA 8-13 T

97

Grader Sloper

1. Equipment Effectiveness: Item is an attachment for road graders that permits more effective sloping. The item is too heavy for TOE graders and was not utilized.
2. N/A
3. N/A
4. Performance: Poor.
5. Incorporation into TOE: Not recommended.
6. Equipment Modification: None.
7. Acceptance Criteria: Not acceptable.

N-89



1970

N-90

99

Dump Truck 12 CY

1. Equipment Effectiveness: The 12 cy dump truck performs all the construction tasks of the 5 ton dump truck. These construction tasks include hauling, spreading base course and surface material, hauling other material incident to construction operations, and for general hauling where the distance is great. The performance of this piece of MCA equipment is superior to the TOE equipment only on good, hard surfaced, trafficable roads. Its advantage is increased pay load. As with all rubber tired vehicles, its performance is affected by adverse weather conditions such as soft, wet surfaces. GMC trucks are generally preferred to International. Maintenance problems of both, however, tend to be less than 5 ton when confined to on-road operation.

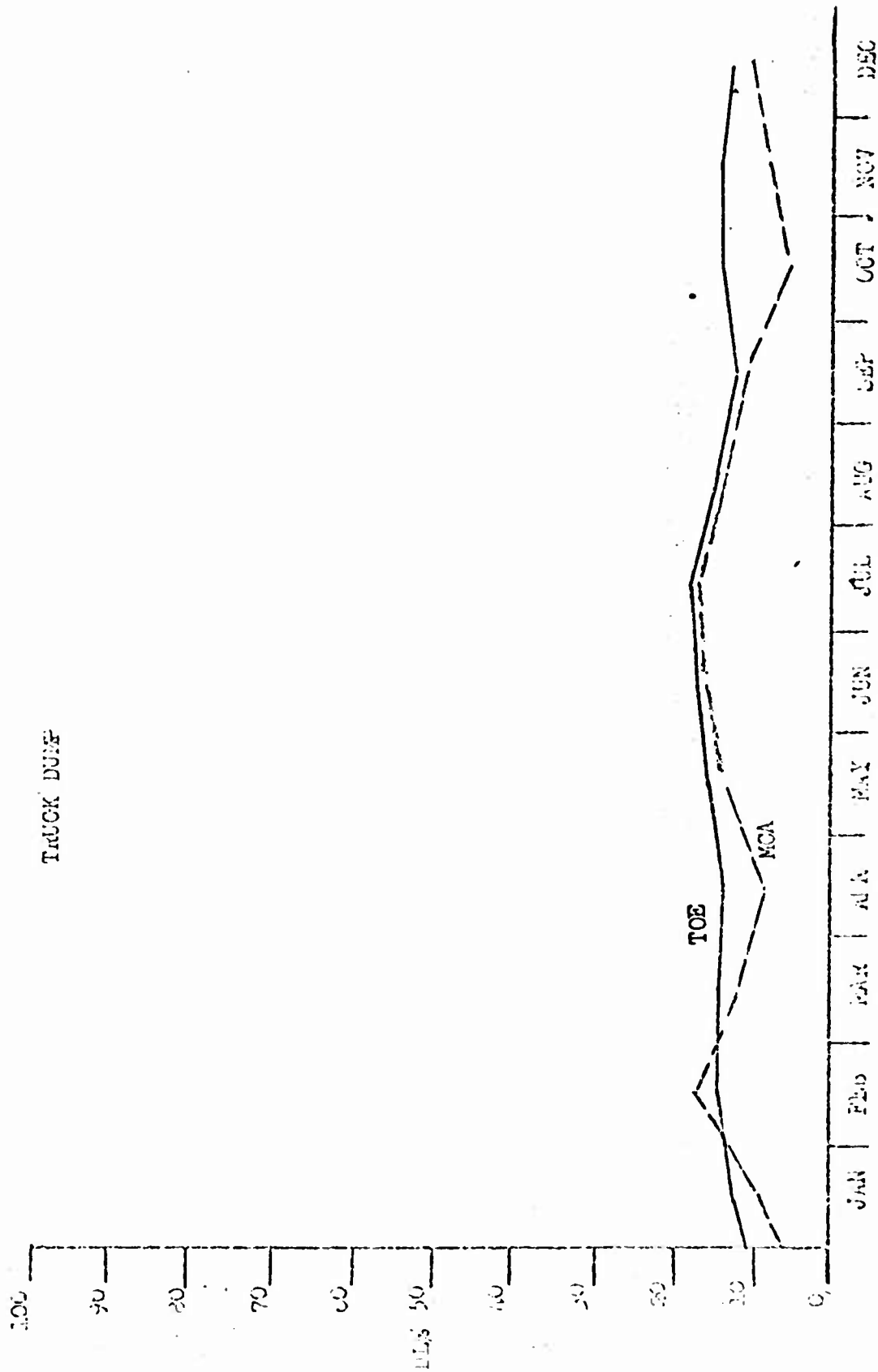
2. Performance: Excellent.

3. Incorporation into TOE: Recommend that the dump truck, 12 CY, be substituted on a ratio of one-for-one for TOE 5 ton rear dump truck in some dump truck companies. These units would support construction battalions for selected missions involving long hauls over good roads.

4. Equipment Modification: Truck should be modified to use a common size military standard tire (e.g. 900x20, 1100x20).

5. Acceptance Criteria: The present operating standards of the MCA dump truck, 12 CY, are acceptable.

TRUCK DUNE



TOE 5 Ton Dumps
MCA 12 CY

1970

101
800 Gal Asphalt Distributor

1. Equipment Effectiveness: Equipment sprays asphalt on surfaces in connection with paving operations and surfacing techniques such as the double bituminous surface treatment. The item is effective but is not as effective as the TOL 800 gal distributor.

2. N/A

3. N/A

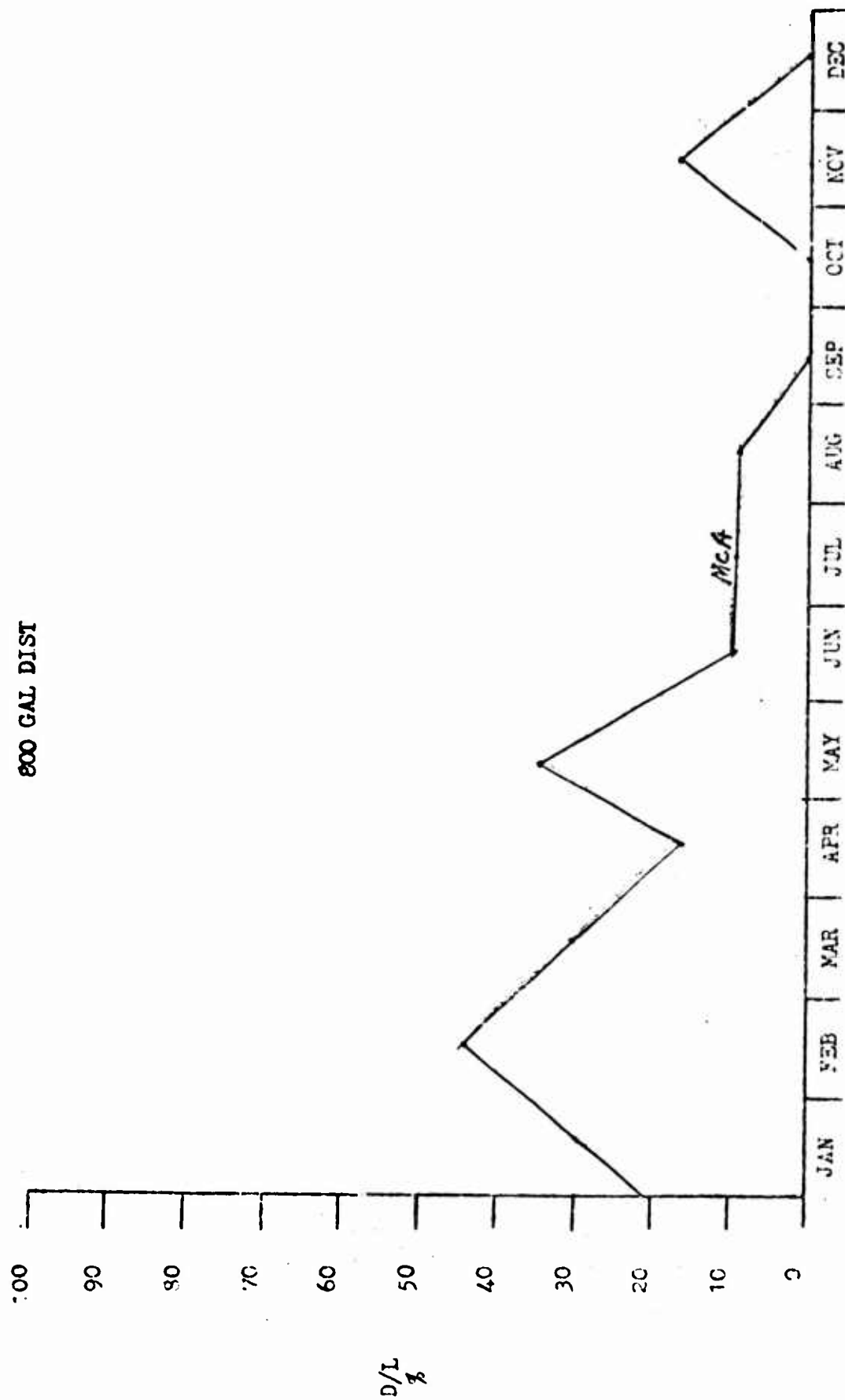
4. Performance: Fair.

5. Incorporation into TOL: Not recommended.

6. Equipment Modification: None.

7. Acceptance Criteria: None.

800 GAL DIST



D/L %

P: 94

1970

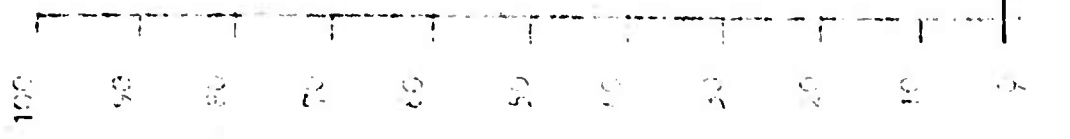
102

103

Cone Crusher

1. Equipment Effectiveness: The cone crusher is used for secondary crushing of rock. The item compares to TOE equipment 75 TPH secondary roller crusher. It requires less maintenance, rebuild time and operating space but enjoys a higher rate of production. Manpower savings is about 50%. Its unique electric powerplant is more efficient and easier to maintain than the fuel powered engine.
2. Impact on Training: None.
3. Add-on Equipment: Services 225 TPH primary crusher.
4. Performance: Excellent.
5. Incorporation into TOE: Augment TOE as required.
6. Equipment Modification: None.
7. Acceptance Criteria: Acceptable as is.

MCA-LOC Cone Crusher



JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
-----	-----	-----	-----	-----	------	------	-----	------	-----	-----	-----

1970

Q-96

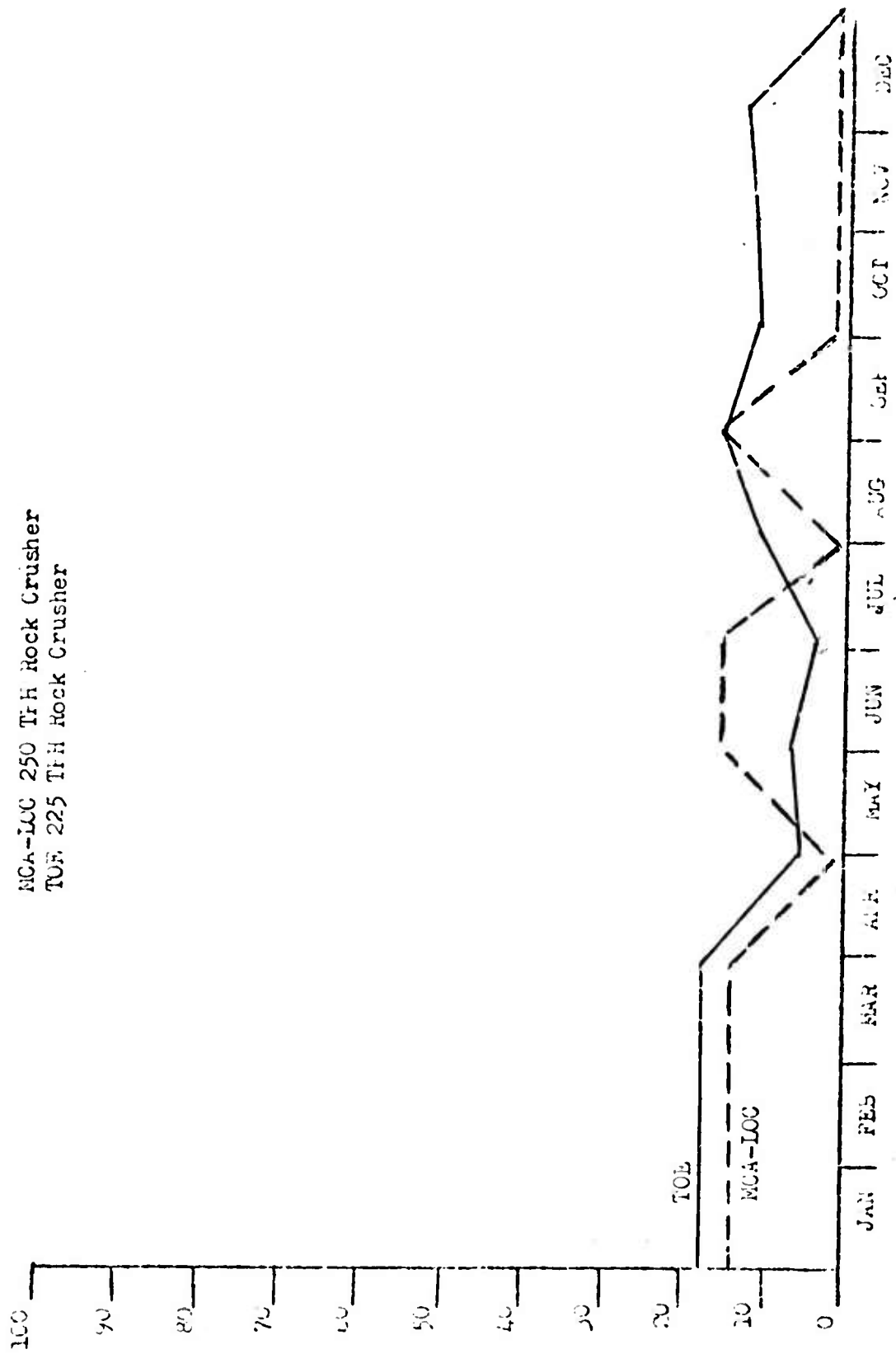
105

250 TPH Rock Crusher

1. Equipment Effectiveness: The item is used to crush rock to various sizes for base course and surface (asphalt aggregate). It is compared to the TOE 225 TPH crusher. It has slightly higher production rates but with 50% less manpower. The primary advantage is that it uses electric motors as a power source rather than fuel driven engines. Another advantage is the vibratory grizzly which eases production by scalping over burden. An additional advantage to the electric powerplant is that it requires less maintenance.
2. Impact on Training: None.
3. Add-on Equipment: Serves both cone crusher and roller secondary crusher.
4. Performance: Excellent.
5. Incorporation into TOE: One-for-one substitution for TOE 225 TPH Crusher.
6. Equipment Modification: None.
7. Acceptance Criteria: Acceptable as is.

R-97

NCA-LOC 250 T/H Rock Crusher
 TOL 225 T/H Rock Crusher



1970

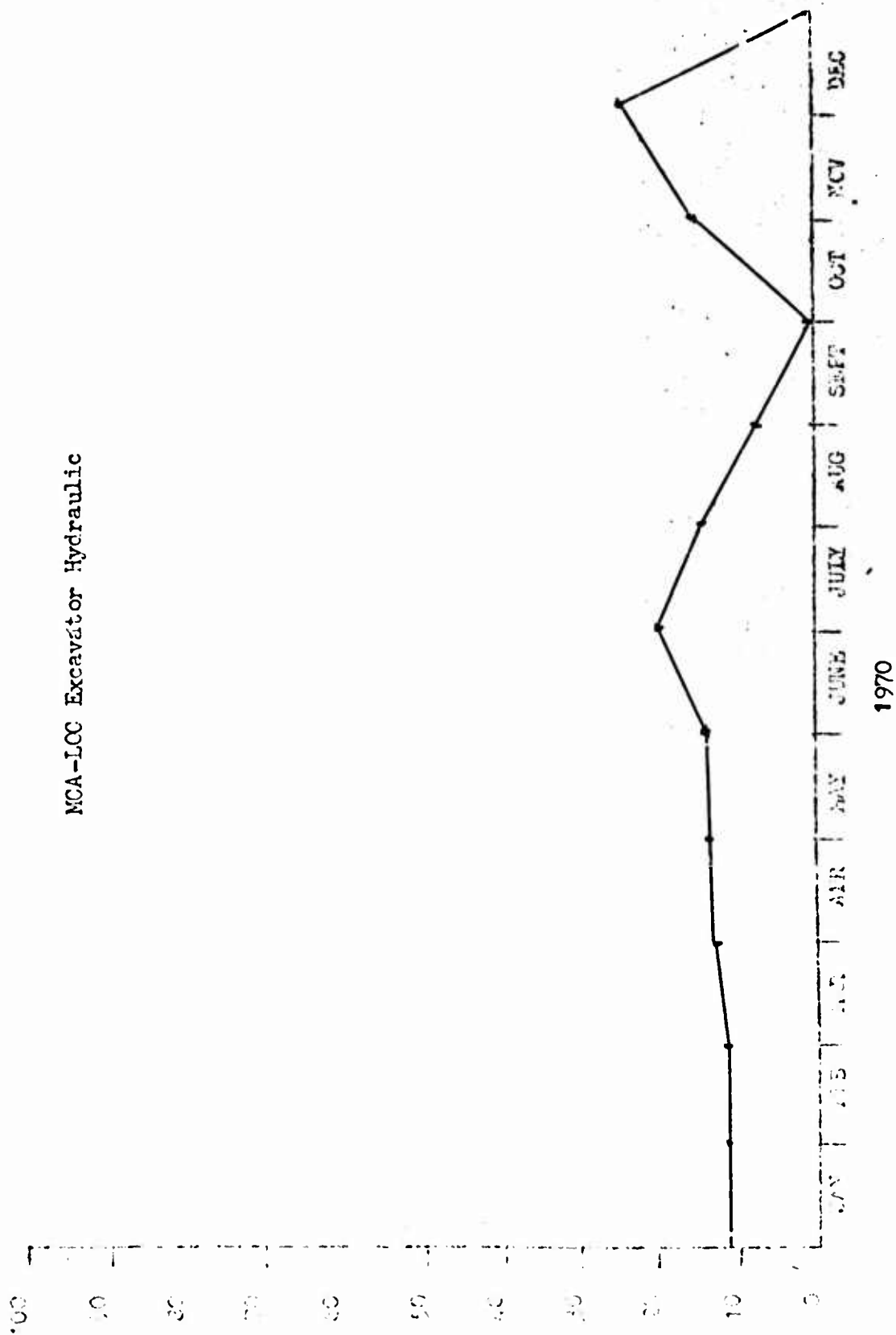
R-98

101

Gradall - Excavator, Hydraulic

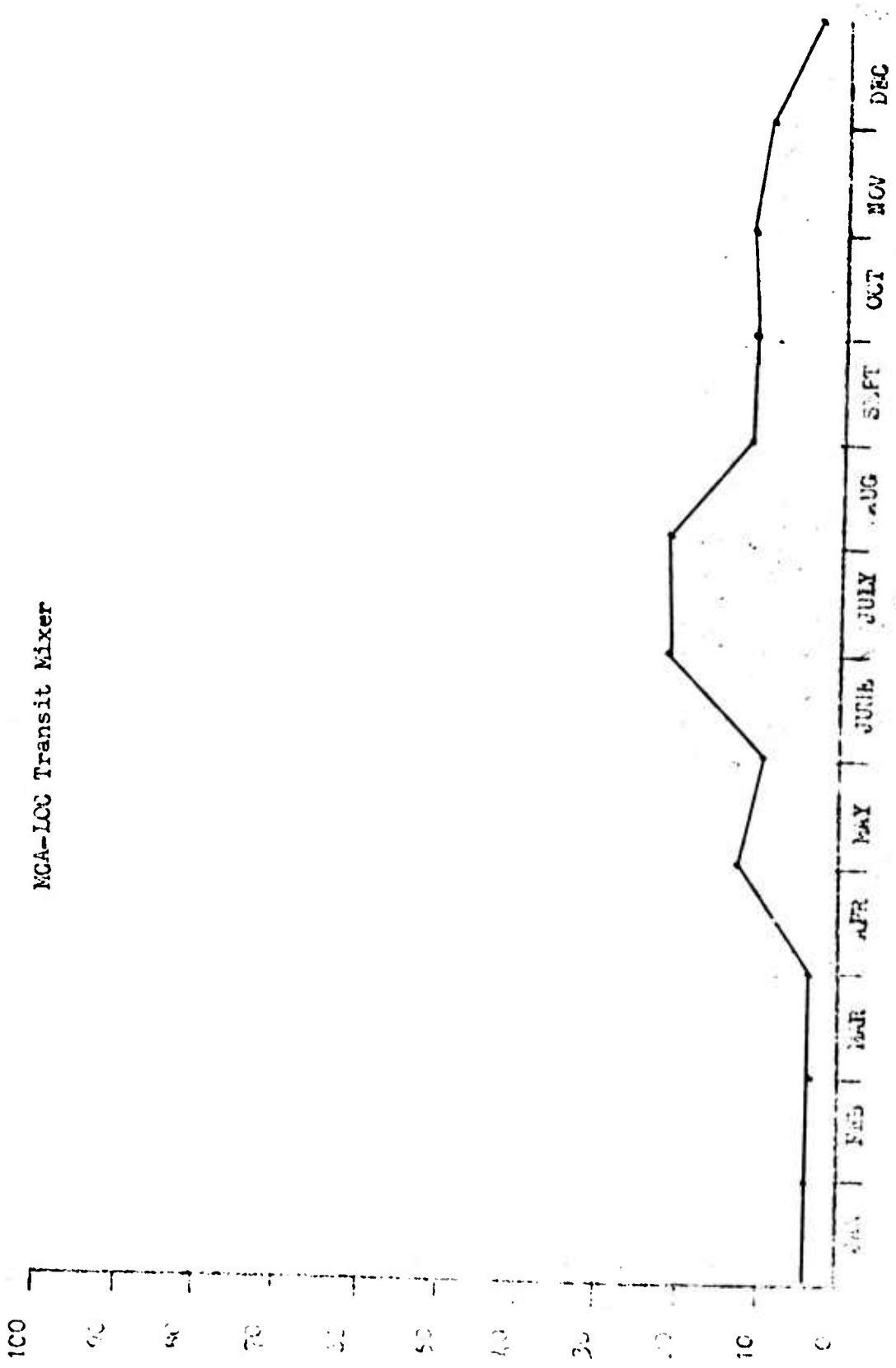
1. Equipment Effectiveness: The Gradall is used for ditching, shaping, sloping, embankment excavation, grubbing, and culvert work. It has no TOE counterpart. It is a very versatile item which can accomplish work no other item can do. It has increased production rates on certain jobs immeasurably. The item is rugged and has no maintenance problems.
2. Impact on Training: Special skills are required. All using units report extensive operator training is an absolute necessity.
3. Add-on Equipment: None.
4. Performance: Outstanding.
5. Incorporation into TOE: One per earthmoving platoon.
6. Equipment Modification: Outriggers will improve stability and increase versatility.
7. Acceptance Criteria: Acceptable as is.

MCA-LOC Excavator Hydraulic



109
Transit Mixer

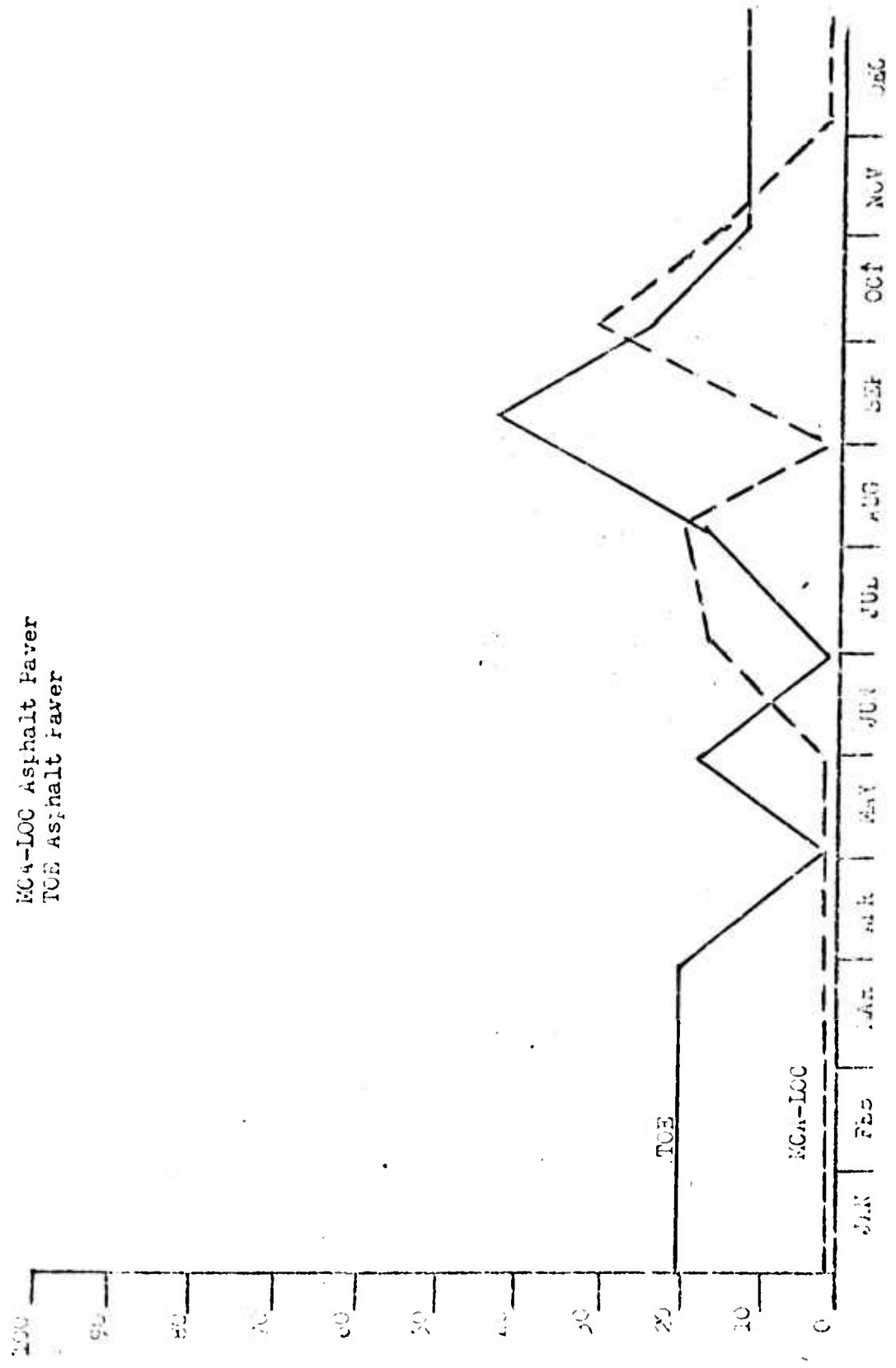
1. Equipment Effectiveness: Used to transport concrete from batch plant to work site. It can be used to mix concrete if hand loaded but is very inefficient. There is no TOE item to compare with the transit mixer. It is a unique item required for special jobs. Maintenance has been a problem due mainly to repair parts availability. Water pumps and steering units are main deficiencies. The equipment must be operated on hard surface roads.
2. Impact on Training: None.
3. Add-on Equipment: Concrete batch plant required to service transit mixer.
4. Performance: Good.
5. Incorporation into TOE: provide with concrete batch plant.
6. Equipment Modifications: None suggested.
7. Acceptance Criteria: Acceptable as is.



/// Asphalt Paver

1. Equipment Effectiveness: The paver is used to lay down the asphaltic concrete surface course on roads. The Cedar Rapids MCA/LOC paver is superior to TOE Barber Green because (1) it is easier to maintain, (2) it is electric driven, (3) it is easier to operate, (4) more rugged, and (5) has 18 ft width capability (compared to 12 ft TOE). Both machines produce a high quality product at about the same rate.
2. Impact on Training: None.
3. Add-on Equipment: Must be serviced by dump trucks.
4. Performance: Excellent.
5. Incorporation into TOE: One-for-one substitution for TOE.
6. Modifications: None.
7. Acceptance Criteria: Acceptable as is.

MC4-LOC Asphalt Paver
TCE Asphalt Paver



1970

113

Jersey Spreader

1. Equipment Effectiveness: The Jersey spreader is used to place stabilized base course. It has no TOE counterpart. It effectively maintains a uniform lift and minimizes separation of aggregate. It has caused no serious maintenance problems.
2. Impact on Training: None.
3. Add-on Equipment: Serviced by dump trucks and propelled by dozer.
4. Performance: Excellent.
5. Incorporation into TOE: Augment as required.
6. Equipment Modification: Reinforce wheels.
7. Acceptance Criteria: Acceptable as is.

V-105

100
90
80
70
60
50
40
30
20
10
0

PCA-LOC Material Spreader

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

1970

V-106

115

Racine Hand Tamper

1. Equipment Effectiveness: Used to hand tamp fill in pot holes and culvert sites. There is no TOE counterpart. The machine has had many maintenance problems due to its light weight and poor construction. It is unsatisfactory to compact asphalt because of the configuration of the compactor foot. However, when operational, it works extremely well in tight places. Its light weight, however, requires that only shallow lifts be worked.
2. Impact on Training: None.
3. Add-on Equipment: None.
4. Performance: Unsatisfactory (with exception).
5. Equipment Modification: Strengthen and increase weight.
6. Acceptance: Not acceptable due to extreme maintenance problems.

W-107

RACINE HAND TAMPER

100

90

80

70

60

50

40

30

20

10

0

W-108

64



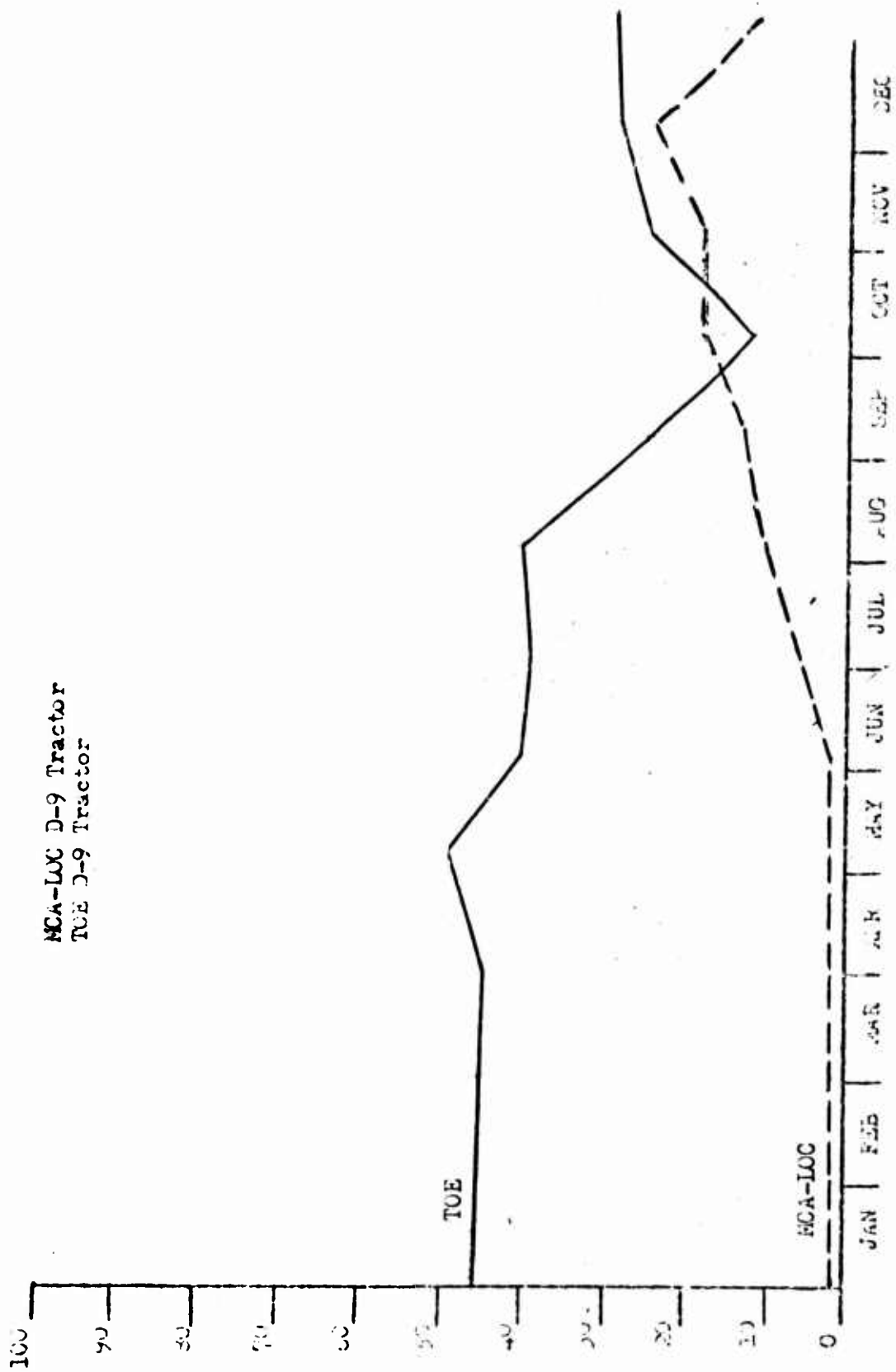
1970

116

117

Caterpillar D9 Tractor

1. Equipment Effectiveness: The D9 is used in quarry work to strip overburden, move large boulders or pieces of fractured rock and stock pile material. It can be compared to TOE D7 tractor. The D9 is invaluable due to its rugged construction, heavier weight and greater power. It doubles production rate of D7. Maintenance problems are less because it is not overworked (strained) in quarry work as is the smaller D7.
2. Impact on Training: Operators require some special training due to greater power.
3. Add-on Equipment: None (in quarry work).
4. Performance: Outstanding.
5. Incorporation into TOE: One-for-one substitution for TOE tractor in construction support company and quarry sections.
6. Equipment Modification: None.
7. Acceptance Criteria: Acceptable as is.



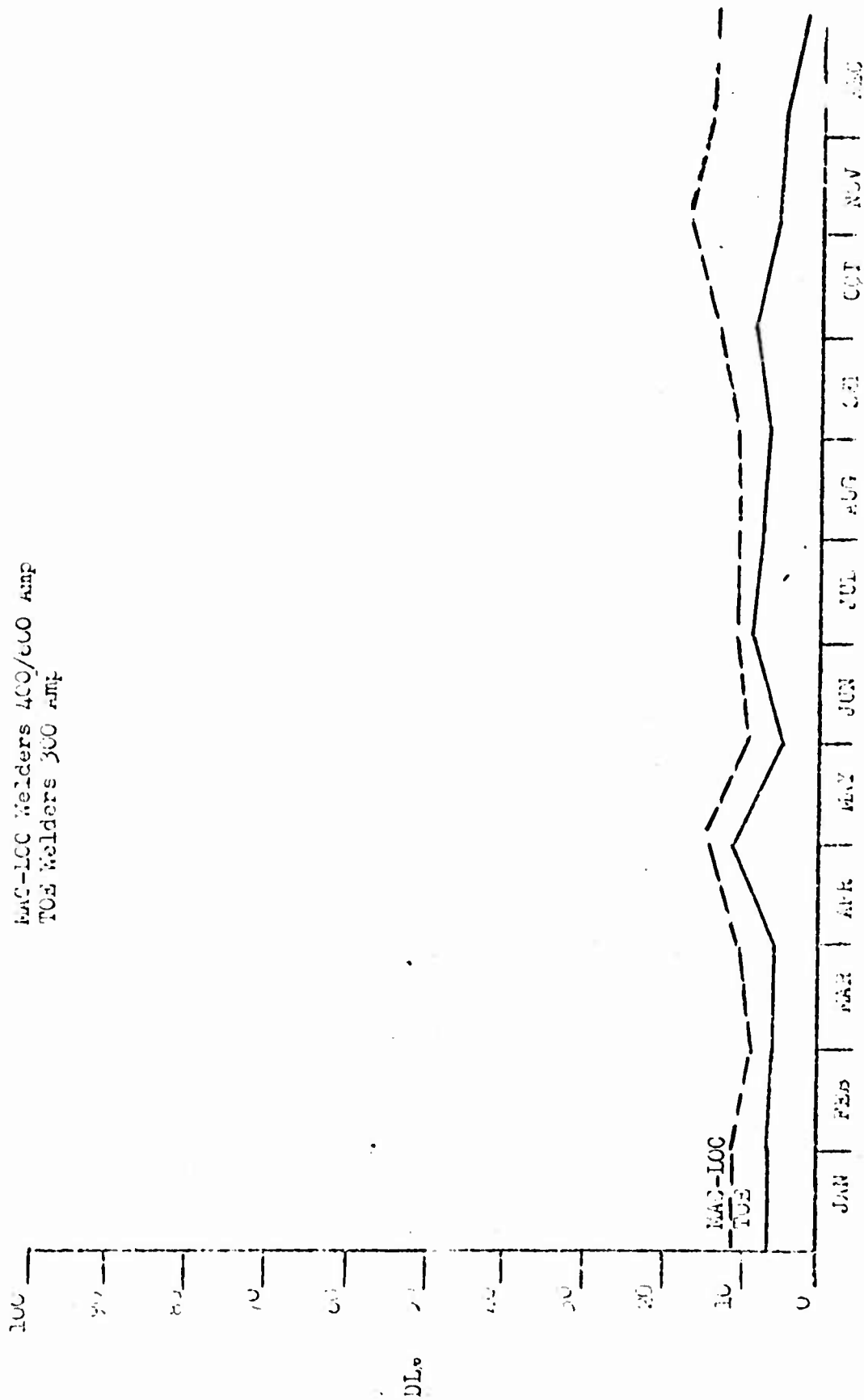
1970

X- 110

600 Amp Welders

1. Equipment Effectiveness: Used for general welding - primarily on rock crushers. This item is superior to the TCE 300 amp welder. The design is good and there are no unusual maintenance problems. The item is considered effective. The Lincoln welder is superior to the Hobart.
2. Impact on Training: None.
3. Add-on Equipment: None.
4. Performance: Good.
5. Incorporation into TCE: One per 225/250 TPH rock crusher.
6. Modification: None.
7. Acceptance Criteria: Acceptable as is.

MAC-LCC Welders 400/600 amp
 TOE Welders 300 amp

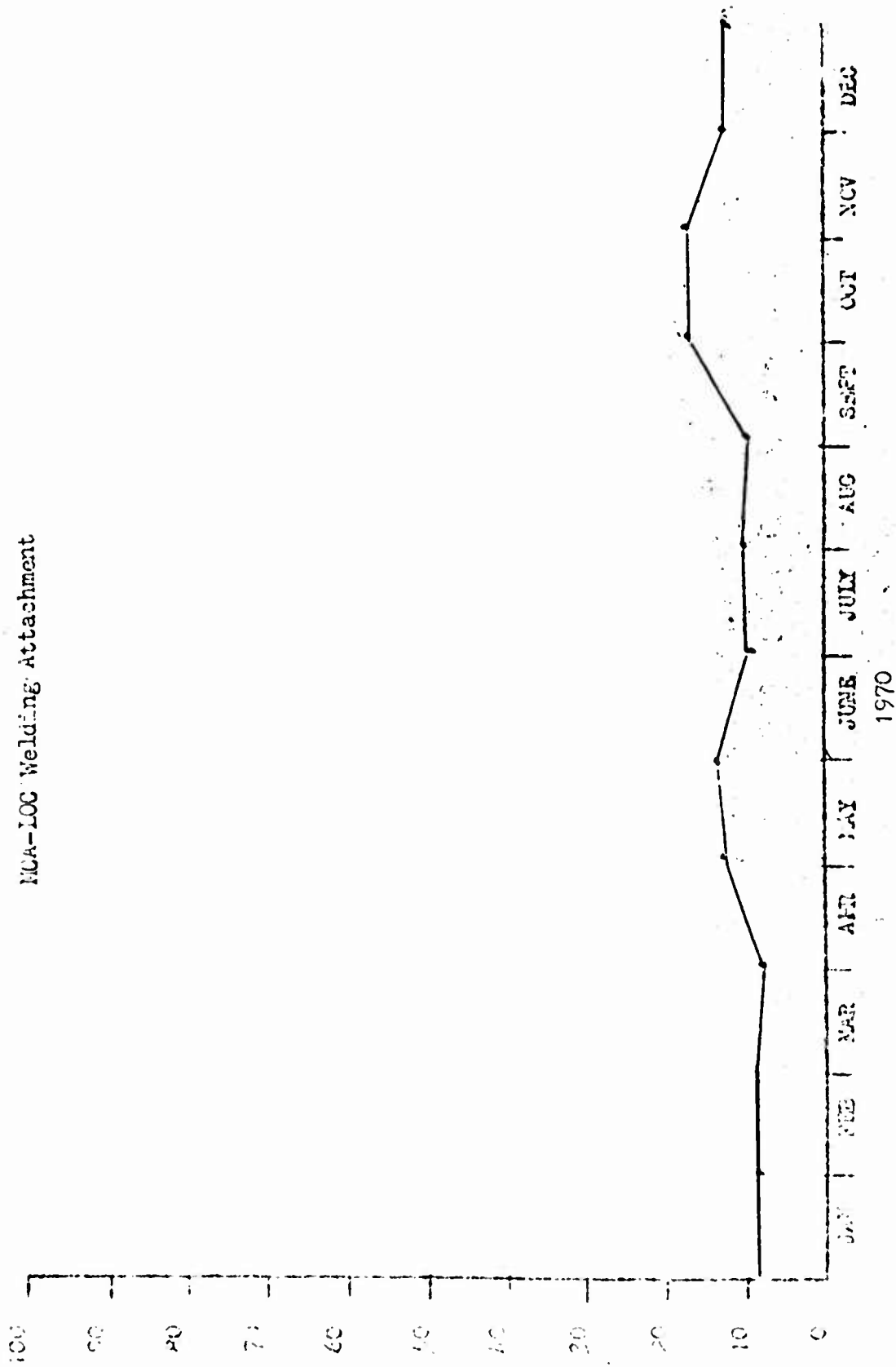


1970

Stoodie Welding Attachment

1. Equipment Effectiveness: The stoodie is used on hard surface rock crusher rolls and cones. It is necessary for efficient maintenance. It has no TOE counterpart. No maintenance problems were expected. It outperforms manual welders by 4 times.
2. Impact on Training: Operator requires special training.
3. Add-on Equipment: 600 Amp welders required.
4. Performance: Excellent.
5. Incorporation into TOE: One per rock crusher.
6. Equipment Modifications: None.
7. Acceptance Criteria: Acceptable as is.

NCA-LOG Welding Attachment



122

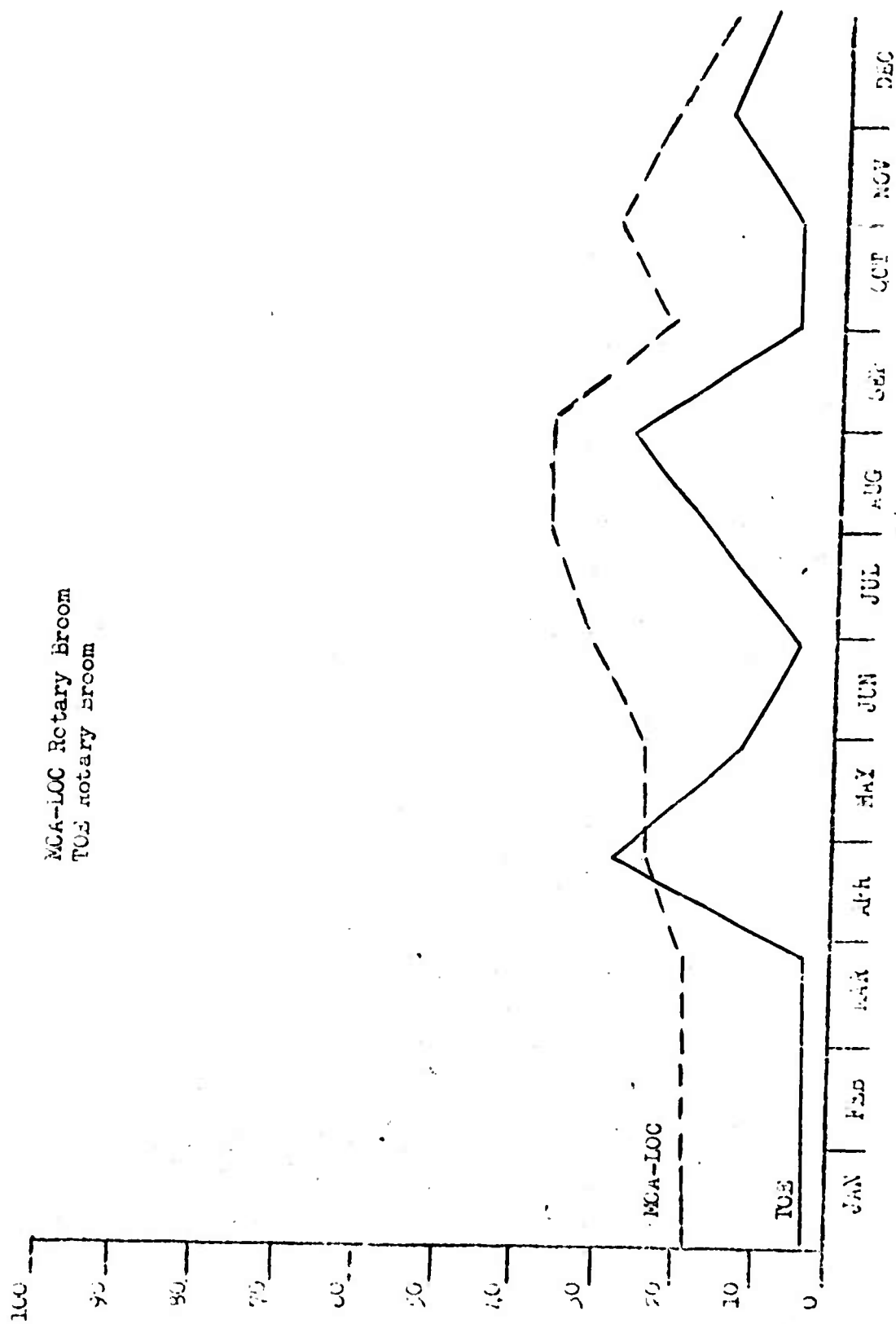
123

Rotary Broom

1. Equipment Effectiveness: Offers no advantage over TUE item.
2. NA
3. NA
4. Performance: Good.
5. NA
6. NA
7. NA

AA- 115

MCA-LOC Rotary Broom
 TOS rotary broom



1970

AA-116

125
Drill Sharpener

1. Equipment Effectiveness: Used to sharpen pneumatic rock drill bits. Major asset is dollar savings; sharpener can sharpen 6-7 bits. There is no TOE counterpart.
2. Impact on Training: Emphasis is required to get men to use device; it is easier to replace the bit.
3. Add-on Equipment: None.
4. Performance: Good.
5. Incorporation into TOE: One per rock drill.
6. Modifications: None.
7. Acceptance Criteria: Acceptable as is.

PRECEDING PAGE BLANK - NOT FILMED

CONFIDENTIAL

121

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
HQ, DA, DA, Washington, D. C. 20310		Confidential
		2b. GROUP
		4
3. REPORT TITLE		
Senior Officer Debriefing Report: MG Charles C. Noble		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Senior Officer Debriefing Report, 29 June 70 thru 5 August 71		
5. AUTHOR(S) (First name, middle initial, last name)		
MG Charles C. Noble		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
21 September 1971	121	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	71B037	
b. PROJECT NO.	8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
N/A		
c.		
d.		
10. DISTRIBUTION STATEMENT		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
N/A		DA, DA, Washington, D.C. 20310
13. ABSTRACT		

118

CONFIDENTIAL

DD FORM 1473
1 NOV 66

Unclassified

Security Classification

(This page is unclassified)